MASTER'S THESIS

What Factors Influence Consumers' Willingness to Adopt a PrePaid Utility Solution Over the Traditional Post Paid Utility Billing Model?

Katsimberis, Athanasia

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What Factors Influence Consumers' Willingness to Adopt a Pre-Paid Utility Solution Over the Traditional Post Paid Utility Billing Model?

Athanasia Katsimberis

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Professor Mark T. Spence and Associate Professor Rafi Chowdhury

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Abstract

Environmental sustainability has become a prevailing topic due to the increased public interest of climate change (Garnaut, 2008). This research contributes to the emerging field of Sustainable Human Computer Interaction (DiSalvo & Brynjarsdóttir, 2010), which is defined as research at the intersection of people, technology and environmental concerns (Petkov et al., 2011). In this context, the prepaid metering smart solution (PPMSS) is a promising technology (Fogg, 2003) that enables and motivates energy consumers to live and act in a more sustainable pro-environmental manner (Petkov et al., 2011), whether they intentionally choose to. This research project uses a mixed-method approach to explore whether a prepaid smart metering electricity solution is ripening as a service option for Australian consumers throughout the demographic spectrum. Evidence suggests that prepaid utility metering leads to a reduction in energy use, hence cost savings. What is unclear is whether willingness to adopt this solution is primarily driven by a pro-environmental consciousness or a host of other consumer psychology, financial, product or demographic factors? Therefore, this study aims to answer this question by researching: “What factors influence consumers’ willingness to adopt a pre-paid utility solution over the traditional post-paid utility billing model?” This research endeavour unearthed that pro-environmental consciousness, emotional involvement (happiness, anger, fear and guilt), direct feedback and expectation of other’s cooperation were all significant factors. In contrast, the factors that were found to not be influential are current energy curbing behaviours, bill auditing energy curbing behaviours, replacement of energy efficient appliances before they break, investment in solar panels, perceived efficacy, concern about paying bill, financial locus of control and putting off other expenditure to pay for the energy bill. The multi-variate regression revealed that happiness and direct feedback are significant factors in the model.

This study highlights to managers and industry stakeholders that marketing campaigners should emphasise the importance of invoking an emotional response in regards to the way humans are altering the environment and the part the consumer can play by adopting the PPMSS. The feelings of anger, fear and guilt had a positive significant relationship and the feeling of happiness had a negative significant relationship. These results do not substantiate the literature which has shown that fear, sadness and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). In contrast this study shows that the feeling of guilt is the most likely to trigger pro-environmental behaviour over the other emotions. In addition to this, these results indicate that negative feelings have a positive effect on pro-environmental behaviours and that positive feelings have the reverse effect. Furthermore, contrary to the literature, the multi-variate regression indicated that only the emotion of happiness had a significant impact in the context of this study.Therefore, marketing campaigners should emphasise the importance of invoking an emotional response in regard to the way humans are altering the environment and the part the consumer can play by adopting the PPMSS.

This research signals that prepayment meters are a powerful tool for consumers to monitor measure and hence manage their energy consumption and budget and consequently increase their energy literacy. Consumers can now be educated with an unprecedented amount of data and transparency on their energy usage. The more granular the data they receive (direct-feedback) in real-time the more empowered consumers are to change their habits. Direct feedback is omnipresent through the use of the PPMSS and comes in the form of an interactive in-home display with live energy consumption data and access to an online portal (McKerracher & Torriti, 2012). If consumers desire to utilise and have access to these novel features, then this will instigate adoption. This is consistent with Fietkau and Kessel (1981)’s model which emphasized that attitudes need to be product specific in order to have any impact on pro-environmental behaviour (Kollmuss & Agyeman, 2002). Direct feedback allows for effective action to conserve through self-regulated learning, this interactivity enables and empowers consumers to change their behaviour habits into the

future. “People learn more deeply through interaction, as it is partly during this practice, and the reflection that comes during and after it, that experiences and messages are filtered and synthesised into meaningful knowledge” (Simcock et al., 2014, p. 463).

Overall, this study shows that prepayment is infact ripening as a service option in Australia. Those who are most eager to adopt new technologies will be more likely to adopt the PPMSS, so early adopters should be targeted for the initial uptake of this solution. This study also indicates that consumers will be more likely to subscribe to new products/behaviours if they perceive that the collective are doing so. Therefore, this is insight for marketers to target a campaign for the mass roll out of the solution so that it is perceived as a new ‘norm’ or a new popular choice with appropriate education of the benefits derived.

This study indicates that the PPMSS should be a choice available to energy consumers despite their age, gender, income or educational status. As M2 from the focus group states, “[w]e should all be given the option of prepaid at the very least!”

Keywords: Environmental Sustainability, Prepayment, Metering, Electricity, Consumer Psychology, Financial, Product, Demographic

Important Definitions / Abbreviations

Consumer: An Australian resident that resides in Victoria, Queensland or Tasmania, that pays for the residential electricity bill and is over the age of 18 years old and is the 'premises occupant' (Accenture, 2011a).

Factors: The variables that will be tested that may influence willingness to adopt the PPMSS which are grouped into the following categories: consumer psychology, financial, product and demographic.

Prepaid Metering Smart Solution (PPMSS): A prepaid smart metering AMI (advanced metering infrastructure) solution that has an in home display, two-way smart metering data communication (Putrus, Bentley, Binns, Jiang, & Johnston, 2013), accessibility to online portal, instantaneous top-ups, per appliance feedback, consumption in dollars, KWHS and dollars/KWH, comparisons with neighbours' usage, SMS and e-mail alerts when credit is running low, online payment facility, carbon emissions impact, live energy tips and social-norming comparative feedback through integration with applications. These meters can be main meters or sub-meters that come after the utility company's main meter.

Social Learning: Technology that enables and educates consumers to learn and interact with technology to analyse their energy usage behaviours by monitoring, measuring and managing their consumption and hence allowing them to review and adjust their behavior, if they choose to, in order to reduce their energy bill and/or their individual impact on the environment.

Sustainable Human Computer Interaction (HCI) Technologies: Technology at the intersection of people, technology and environmental concerns.

Traditional Post-Paid Utility Billing Model: Main meters used by utility companies to measure consumption and bill after energy has been consumed. These meters have not traditionally been designed as displays to encourage customers to view and monitor their own-energy consumption. These legacy meters have relatively crude displays, which tend to dissuade householders from using them as energy-saving tools (Wood & Newborough, 2003).

TOU Tariff: Time-of-use tariff where consumers are charged different prices depending on the time of the day that electricity is used. Peak periods are priced higher to encourage consumers to shift their energy usage to the off-peak and shoulder periods when the price is lower in order to reduce the load impact on the grid.

Utility: Electricity.

Willingness to Adopt (WTA): Consumer's preference for the adoption of the PPMSS.

Statement of Originality and Declaration

This thesis is submitted to Bond University in fulfillment of the requirements of Masters of Philosophy in Business by Research (Marketing). This thesis document is to the best of my knowledge, original and my own work towards this research degree, except where acknowledged in the text referencing. This work has not been submitted, either in whole or in part, for a degree at Bond University or any other University, except where due acknowledgement is made.

Athanasia Katsimberis

Research Outputs During Candidature

Katsimberis, A. (2016, February) *What Factors Influence Consumers' Willingness to Adopt a Pre-Paid Utility Solution Over the Traditional Post-Paid Utility Billing Model?* Poster Session presented at the American Marketing Association 2016 Winter Conference, Las Vegas, United States.

Katsimberis, A. (2015, November) *What Factors Influence Consumers' Willingness to Adopt a Pre-Paid Utility Solution Over the Traditional Post-Paid Utility Billing Model?* Paper presented at the ANZMAC 2015 Conference Innovation and Growth Strategies in Marketing, Sydney, Australia.

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Chapter One: Introduction

Australian Residential Energy Consumers' Current Energy Analysis Environment

Imagine a hypothetical world in which a father drives up to the petrol pump in his large Jeep, fills up his car, and drives away without paying anything. The petrol is not free, but the father will not know how much he purchased or how much he owes until 3 months later because he has a quarterly account with the petrol station. When his wife drives up to the pump in the family Hyundai, she goes through the same procedure; as does their teenager who drives up to the pump in her compact BMW mini cooper. The family gets a combined bill at the end of the quarter and do not have a clear breakdown as to how these charges accumulated. Was it the father's driving, the wife's driving, or their daughter's driving that accounted for the largest portion of the bill? What makes life even more interesting for this family is that none of their cars have a speedometer or petrol gauge. They get no feedback at all on how to manage their petrol bill and they have no way to audit what they have been charged. If you substitute the petrol station with a typical Australian energy retailer then this hypothetical scenario is not in a parallel universe but typical practice in the energy industry (Faruqui, Sergici, & Sharif, 2010). How can consumers control, economize and conserve energy under such a billing scheme?

As has been illustrated in the hypothetical scenario above, the post-paid energy analysis environment does not enable consumers to proactively be aware of their consumption as the post-paid billing system is not as clear, fair, accurate and transparent as it could be. Energy retailers capitalize on the fact that curtailing energy in the home is often a difficult task as energy is abstract, invisible and untouchable (Fischer, 2008) and its use is often a by-product of other habitual domestic and lifestyle tasks. As there is no tangible manifestation of energy use it often goes unnoticed - unlike, for example, the decreasing amount of milk in the fridge, the increasing dullness of a razor blade, or a gas gauge nearing empty (Froehlich, 2009). Most residential consumers are unable to judge their

household energy usage other than their quarterly bill which is often presented in dull and unexciting formats (P. C. Stern & Aronson, 1984) so although some valuable information may be present, there is a limited chance that this historical information will be read, remembered (Froehlich, 2009) and acted upon. The traditional system by default situates the consumer in a reactive rather than a proactive mode. This means that the preservation of the environment through the conservation of electricity consumption at home is a difficult task for Australians.

It is evident that an unprecedented number of consumers are unsatisfied with the traditional billing system and are being crippled by the unending rounds of energy price increases. According to Clare Petre, the *Energy and Water Ombudsman in NSW*, thousands of families in NSW are struggling to pay their bills resulting in mounting arrears, credit listings and disconnections. A record 37,485 complaints were received from 2013-2014. Half of these complaints pertained to billing and a quarter related to affordability. This is further validated by the *Australian Energy Regulator* who reported that there were 25,900 electricity disconnections in NSW for the first nine months of the past financial year, a thousand more disconnections than the 12 months before (Han, 2014).

These issues have also permeated in other Australian states such as Queensland. The *Energy and Water Ombudsman in Queensland* closed a total of 14,096 cases, 86% of which were electricity complaints, the majority of which were from the residential sector (Q. Energy and Water Ombudsman, 2013). The most common complaints were about billing (incorrect bills, high bills and bill delays), credit (consumers finding it difficult to pay) and transfers (Q. Energy and Water Ombudsman, 2013).

Alarmingly, the *Electricity Industry Code* states that retailers must use their 'best endeavours' to read the meter at least once every 12 months (Q. Energy and Water Ombudsman, 2013). Evidently, this does not place a stringent standard on energy retailers to provide meter readings that match the typical residential billing cycle. Due to practicality reasons, the post-paid billing system is fraught with estimated rather than actual meter readings as most traditional metering devices do not allow for retailers to remotely view meter readings. This is particularly the

case in Body Corporate type environments where the bill is apportioned according to the lot entitlement and often there are no individual meters per lot. Therefore, meter readings based on estimations degrades the consumer's energy analysis decision quality. In addition to this, the anachronistic post-paid quarterly frequency of the billing cycle does not make the purchase of energy at the forefront of the consumer's mind. If residential consumers do not have an accurate, live, transparent and fair depiction of their energy usage then how can they determine what their individual impact is on the environment and act in their best interests?

Energy Industry Trends

The residential sector's consumption of electricity is a key contributor to Australia's greenhouse gas emissions as Australia relies on fossil fuels (notably coal) to produce energy (Australia Bureau of Statistics, 2010). In 2014, it was shown that Australians use more energy per capita when compared to most of the other nations in the world (Appendix A) (Burn, 2014). This is substantiated by the Finkel Report written by Chief Scientist Alan Finkel. The Finkel report is a blue print for the future to help Australia reduce its impact on the world by moving to cleaner energy alternatives, so that the planet avoids climate change. Electricity generation is Australia's biggest single source of pollution accounting for 35%. Currently, 87% of the electricity going into the Australian National Electricity Market derives from fossil fuels (77% from high-emission black and brown coal and the remainder 10% from gas). Only 13% of the total comes from renewable clean energy sources (Sturner, 2017). The four key outcomes from the *Finkel Report* are increased energy security (immune to the impact of natural disasters and cyber-attacks), future reliability of energy by replacing ageing generators, setting lower emissions targets, promoting investment in cleaner technologies and rewarding consumers. As consumers are at the heart of our electricity system the actions of consumers should be encouraged to improve the reliability and security of the electricity system to keep costs down. Consumers should be better informed and rewarded for managing their electricity demand. System upgrades

and new generation of energy should be achieved at a lower cost for successful outcomes (Energy, 2017).

This indicates that the use of energy plays an integral role in sustaining Australians' lifestyles as the majority of households in Australia use electricity as their main source of energy. Consequently, as Australians use a lot of energy in a global context consumers need to have the necessary conditions for effective and efficient decision making concerning their individual contribution to climate change (Garnaut, 2008), which may include a conscious desire for Australians to reduce their environmental footprint.

Australian energy consumers are subject to rising power bills, which they are unable to proactively control and analyse as they often receive a surprise bill at the end of the quarter. According to the *Energy Users Association* Australian energy prices ranked amongst the most expensive countries in the world in 2011 (Appendix B) (Peddie, 2012). Although Australian energy prices were stable until 2007, since then they have continued to rise (Appendix C) (Mountain, 2012).

The Australian government's *Energy White Paper* has warned that an estimated $30 billion will be spent on network infrastructure costs across Australia in the next 5 years with the aim of sustaining the demand of peak consumption, which occurs less than one percent of the time (Lipman, 2012). Unfortunately, this poor use of capacity means that consumers are faced with increased power prices which are predicted to be amongst the fastest rising in the world (Appendix D) (Mountain, 2012).

Electricity bills are a key contributor to the financial strain of Australian bill payers as electricity is often a necessary and unavoidable expense in the landlord and household budget. According to a national survey conducted in 2014 by Ernst and Young "1 in 8 Australians missed an electricity payment because they couldn't afford it" and "[n]early one in three have missed an electricity bill payment in the past 12 months"(Ernst & Young, 2014, p. 2). In addition to this, the proportion of customers occasionally or often worried about being able to pay their electricity bill has remained consistently high at 70% since Ernst and Young

last undertook the survey a year before (Ernst & Young, 2014). Therefore, this is proof that increased energy costs are squeezing household budgets and contributing to hardship for Australians.

A means to ensure a sustainable future for Australia would be for residential energy consumers to be accountable and mindful of their consumption, particularly at peak demand periods. Consumer intelligence derived from a prepaid smart metering solution, coupled with predictable time-of-use tariffs, will be a powerful consumer tool to flatten peak demand periods, roll back power prices and reduce Australia's carbon footprint, whilst at the same time reducing individuals' energy bills.

The Solution

Stern (2007) is an advocate for the diffusion of innovative low carbon technologies in order to address the serious and urgent issue of climate change. Stern warns that if emissions continue unabated the entire globe will experience a radical transformation of its climate, which consequently will alter humans' way of life. Furthermore, he emphasizes that citizens of the earth have a powerful role to mitigate the risks and scale of impact arising from climate change (Stern, 2007). In particular, the Garnaut Review draws attention to Australia's high level of exposure to the impact of climate change saying that: "the extent to which these impacts are realized will depend on the success and timing of global greenhouse gas mitigation and on national adaptation efforts" (Garnaut, 2008, p. 124). National adaptation efforts can materialize in two approaches. Firstly, changing how energy is produced. Secondly, changing individuals' behaviour patterns. The focus herein is the latter approach. Either way, reducing Australia's carbon footprint is of paramount importance whether this is on a macro scale or micro scale where consumers collectively have the power to make a difference.

The *Australian Energy Market Commission's Power of Choice Review* has highlighted the vital need for effective information on energy consumption to increase consumers' awareness, education and engagement (Australian Energy Market Commission, 2012). The rapid development of new technologies in the

marketplace will enable consumers to be in the driver's seat steering their utility destiny. If consumers are given the tools to monitor measure and hence manage their electricity consumption in a proactive, efficient and effective manner then collectively they will be able to reduce their impact on the grid and act as environmentally responsible citizens by lowering their carbon footprint and consequently also save money.

Sustainability in energy terms "can be understood as a continuous learning process that occurs when a given society acquires the necessary knowledge to reduce its energy consumption…without diminishing its quality of life or creating new social inequalities"(Tabara, Darier, Gerger, Kasemir, & Schule, 1999, p. 1). Developers of innovative technologies in the energy sector should create consumer tools for social learning, as "social learning is a prerequisite for sustainable energy use"(Darby, 2006b, p. 2929).

Prepayment smart meters are a means to unlock social learning behavior by enabling Australian consumers to receive direct feedback i.e. real time information on their energy consumption and costs and "turn a once opaque and static electric bill into a transparent, dynamic and controllable process" (Faruqui et al., 2010, p. 1598).

Prepaid Sustainable HCI Technology could be the catalyst to shift the accountability of electricity consumption to the end user by actively engaging them in the process of energy conservation management. The combination of a prepayment functionality embedded in a smart meter should amplify the behavioural change effects and hence lead to a reduction in energy usage per household. A study found that an in home display is accountable for a 7% reduction in electricity consumption when used alone (Faruqui et al., 2010). In cases where prepayment is combined with an in home display the consumer's electricity consumption reduces by 14% (Faruqui et al., 2010). Darby (2006a) provides confirmation of this in her paper and states that direct feedback on energy consumption at home (immediate, from the meter or an associated display) can lead up to 15% in energy savings (Darby, 2006a). This evidence is further exemplified in a live case study conducted by the Canadian utility

company Woodstock Hydro in Ontario. The company experimented with 'pay as you go' systems and claims that "25% of their customers who use the system are using between 15 and 20% less energy than they were doing under the traditional system of payment, because the display unit makes them aware of what they are consuming"(Darby, 2006a, p. 10). However, this conservation effect must not be underestimated as there is evidence to suggest that households can reduce their energy bills by as much as 54%. This was demonstrated in another live case study sponsored by the Australian Department of Foreign Affairs and Trade that was conducted by the Marshalls Energy Company in 2011 on 350 prepay meter customers in the Marshall Islands (Australian Government, 2013).

Rationale of Research

Despite the high satisfaction rates noted by utility companies and customers in foreign jurisdictions, the global uptake of prepaid meters has been confined to only a few countries such as China, South Africa, Turkey, Ireland and the UK. These nations account for 97% of the world's installed base. Australia, New Zealand and other nations are relatively untapped markets in this regard and account for the remaining 3% (Action, 2014). According to Pike Research the prepaid revolution is coming as 33.5 million prepaid meters will be shipped worldwide by 2017 (Kaften, 2012).

This research project seeks to explore whether a prepaid smart metering electricity solution is ripening as a service option for Australian consumers who are residents in Victoria, Queensland or Tasmania, that pay for their residential electricity bill and are over the age of 18 years old and are the 'premises occupant'.

Evidence suggests that prepaid utility metering leads to a reduction in energy use hence cost savings (Faruqui et al., 2010). What is unclear is whether willingness to adopt is primarily driven by pro-environmental consciousness or a host of other factors (consumer psychology, financial, product and demographic). Therefore, this study aims to answer this question by researching: "What factors influence

consumers' willingness to adopt a pre-paid utility solution over the traditional post-paid utility billing model?"

This study is significant because there is no independent academic consumer behaviour research on the use and adoption of smart metering with embedded prepayment functionality on potential consumers in Australia. Most studies are industry reports that are based only on existing customers who have had prepaid meters installed in their homes or from the perspectives of government, retailers and network service providers mostly in foreign jurisdictions. As such, Australia as a region is severely neglected in the academic literature despite being one of the leading countries to roll-out smart grid infrastructure (McKerracher & Torriti, 2012). In addition to this, the literature in this area often segregates smart meters and prepaid meters whereas this study will be testing the consumers' willingness to adopt a combined prepaid smart metering solution with advanced functionalities. These advanced functionalities displace the shortcomings inherent with traditional (coin, magnetic card or token operated) prepayment systems.

Smart prepayment is a mega trend in the utilities space and it is only a matter of time before the PPMSS proliferates internationally (Kaften, 2012; Hub, 2016; Action, 2014). The worldwide deployment in 2016 will be at unprecedented rates due to the increasing popularity of smart phone ownership and the increasing demand and improvement of smart prepaid account management software solutions (Hub, 2016).

In addition to this, in the past consumer protection concerns have evoked debate and hampered the implementation of prepaid technology for utilities. However, as evidence of the benefits for consumers and utilities emerges through many prepay programs being run by electricity cooperatives across the globe, regulators are becoming more open towards prepaid services, particularly in the USA, and their outlook is more optimistic than in the past. Concurrently, there is also mounting interest amongst energy retailers to leverage on the well-known energy conservation effects of prepayment to support policy goals of carbon reduction (Hub, 2016).

“Selling focuses on the need of the seller, marketing on the needs of the buyer”(Levitt, 1986, p. 153). Despite numerous acknowledged benefits of prepayment smart metering from the eyes of industry stakeholders, this paper aims to research in a framework that adopts a market driven approach rather than a government mandated approach by exploring whether consumers would be willing to embrace this technology by choice. This will be achieved by trying to understand the psychology behind environmental green buying behaviour with an attempt to understand the influences, needs and desires of the ‘energy’ consumer rather than focusing solely on the needs of other industry stakeholders. In this way the researcher will be closer to achieving the goal of marketers: to create satisfied customers (Grant, 1999).

Structure of Thesis

This research paper has firstly introduced the current status quo of the traditional postpaid billing system in Australia and has highlighted some pertinent trends which drive the rationale of this research and thus the upsurge of prepaid smart utilities. Chapter two will explore the background framework and analysis and unveil the proposed model and elaborate on the cross-disciplinary factors that will be examined in this research study. Chapter three will elaborate on the research method and design used for this study. Chapter four will go into an overview of the qualitative research findings. Chapter five will indicate the survey scale purification that was conducted for this research project. Chapter six will cover the findings of the survey. Chapter seven will summarise the qualitative and quantitative findings. Chapter eight will examine the key insights to the existing body of literature that can be extracted from this research. Chapter nine will focus on the key insights for industry stakeholders and managers. Lastly, chapter ten will conclude the research with the limitations of the study design and suggest directions for future research.

Chapter Two: Background Framework of Analysis and Proposed Model

This research study aims to extend the field of environmental consumer behaviour by analysing the factors that influence pro-environmental behaviour. A supposition is that pro-environmental consciousness is a primary driver of pro-environmental behaviour. Pro-environmental behaviour in this context means minimizing the negative impact of one's actions on the natural and built world by minimizing energy consumption through the voluntary adoption of a pre-paid smart metering utility solution(Kollmuss & Agyeman, 2002).

There are several prominent and commonly used theoretical frameworks that attempt to explain the gap between the possession of environmental knowledge and awareness and how this impacts on pro-environmental behaviour. The oldest and simplest models of pro-environmental behaviour were US linear progression models from the 1970's that assumed that environmental knowledge lead to environmental awareness and concern (attitudes), which resulted in pro-environmental behaviour.

However, these models were subsequently proven to have weak predictive power as it was found that increased knowledge and awareness does not strongly influence enlightened pro-environmental behaviour (Kollmuss & Agyeman, 2002). Knowledge and awareness have weak predictive power in regards to action because consumer behaviour is a complex phenomenon, as humans do not alter their habits very easily even if there is distinct advantage of the new behaviour over the old one. Often, consumers may be willing to change their behaviour, but they do not persist and practise the behaviour enough until it becomes a habit (Kollmuss & Agyeman, 2002).

Figure 1: Early models of pro-environmental behaviour

Since the inception of the early models of pro-environmental behaviour many researchers have attempted to explain the discrepancy between attitudes and behaviours. Rajecki defined the following causes (Rajecki, 1982):

1. *Direct verses indirect experience*: There will be a weaker correlation between attitude and behaviour if the experience of learning is indirect.
2. *Normative 'social' influences*: Cultural traditions, family customs and social norms impact on people's attitudes. If the culture propagates a lifestyle of sustainability, then there will be a shorter gap between attitudes and pro-environmental behaviour and vice versa.
3. *Temporal discrepancy*: People's attitudes change over time so the data collection of the attitude and the action must not be far apart, as this will provide inconsistent results.
4. *Attitude-behaviour measurement*: The measure of attitude must be towards a particular behaviour otherwise there will be no correlation. Even people who are concerned about climate change tend to drive, as the attitude toward climate change is not closely related to the behaviour (driving) (Kollmuss & Agyeman, 2002).

Ajzen & Fishbein (1980) created the *Theory of Reasoned Action* due to their assumption that people are rational in that they systematically utilise the information that is accessible to them and they are not "controlled by unconscious motives or overpowering desires" and their behaviour is neither "capricious or thoughtless" (Ajzen & Fishbein, 1980, p. introduction). Therefore, attitudes impact behavioural intentions, which shape our actions. However, normative pressures also impact intentions. Thus, "the ultimate determinants of any behaviour are the behavioural beliefs concerning its consequences and normative beliefs concerning the prescriptions of others"(Ajzen & Fishbein, 1980, p. 239).

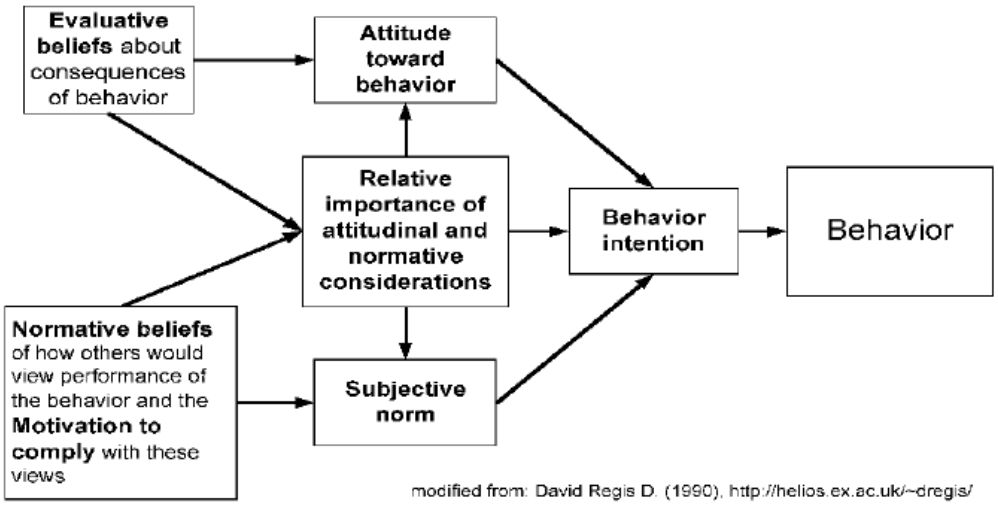

Figure 2: Theory of reasoned action (Ajzen & Fishbein, 1980)

Hines, Hungerford and Tomera created a *Model of Responsible Environmental Behaviour,* which was based on Ajzen and Fishbein's theory of *Planned Behaviour.* In their paper they conducted a meta-analysis of 128 pro-environmental behaviour research studies and discovered the following variables associated with responsible pro-environmental action (Hines, Hungerford, & Tomera, 1987):

- *Knowledge of issues:* Awareness of environmental problems and causes.
- *Knowledge of action strategies:* The person has to be aware of how they should act to alleviate their personal impact on the environmental problem.
- *Locus of control:* The individual's perception of whether they have the ability to bring about change through their own behaviour. A strong internal locus of control means that they perceive that their actions can bring about change. On the other hand, people with an external locus of control believe that their actions are insignificant in the whole scheme of things and that those in powerful positions can only initiate these changes.
- *Attitudes:* People with strong pro-environmental attitudes will be more likely to engage in pro-environmental behaviour, yet still the relationship between attitude and action was proven to be weak. This is a general attitude, not an attitude towards a specific act.

- *Intention to Act through Commitment:* The communicated willingness to take an action indicated the person's willingness to engage in pro-environmental behaviour.
- *Personal Responsibility:* People who have a greater sense of personal responsibility are more likely to engage in environmentally responsible behaviour.

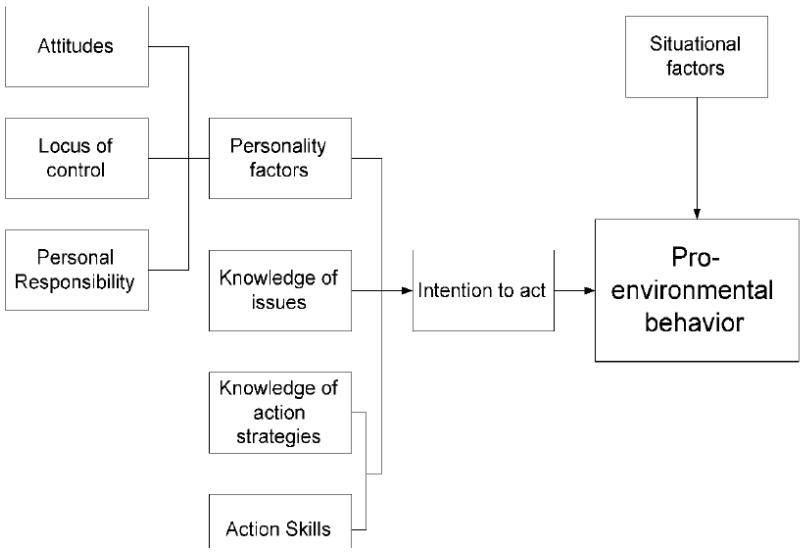

Figure 3: Models of predictors of environmental behaviour (Hines et al., 1987)

Fietkau and Kessel (1981)'s sociological model for analysing pro-environmental behaviour emphasized the importance of not only viewing psychological factors in isolation but also including sociological factors. They emphasize the importance of the following variables in their model:

- *Attitudes and values:* Attitudes and values influence pro-environmental behaviour.
- *Possibilities to act ecologically:* People are enabled or hindered to act due to economic (income), and external factors (e.g institutional, social and cultural factors)
- *Behavioural incentives:* Factors that reinforce and support pro-environmental behaviour (e.g. quality of life, monetary savings, social desirability etc.)

- *Perceived feedback about ecological behaviour:* People have to receive positive reinforcement to continue acting in an ecologically friendly manner.
- *Environmental Knowledge:* Knowledge modifies attitudes and values and does not directly
  impact pro-environmental behaviour.

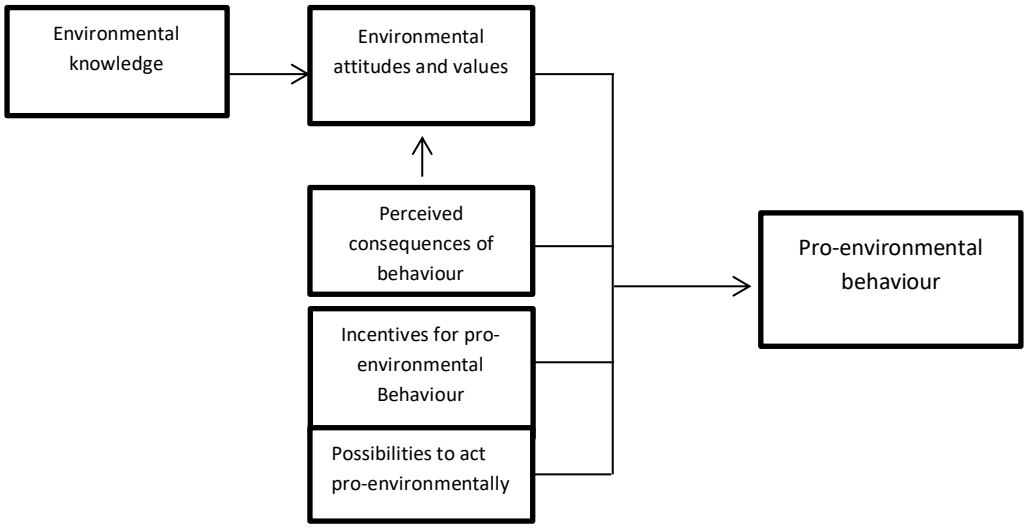

Figure 4: Model of ecological behaviour (Fietkau & Kessel, 1981) rearranged to reflect pro-environmental behaviour as the dependent variable

Blake (1999) has highlighted that the shortfall of most pro-environmental behaviour models is that they fail to address constraints that are social (cultural norms e.g. cultures in small highly populated countries such as Switzerland and the Netherlands tend to be more resource conscientious than societies in large resourse-rich countries such as the USA) (Kollmuss & Agyeman, 2002) institutional (e.g. access to public transport and the ability to recycle) and the individual's temperament and motivation (e.g. laziness, wrong person, lack of interest,). In this context, Blake expands on this and contributes three obstacles to action: individuality, responsibility (lack of efficacy, no need, lack of trust and do not own property) and practicality (lack of time, money, information, encouragement, facilities and storage). Although Blake provides a useful model he does not incorporate social factors such as familial pressures and cultural norms (Kollmuss & Agyeman, 2002).

In addition to this, the models assume that humans are rational and logically utilize the information that they are exposed to (Kollmuss & Agyeman, 2002). “One of the most important insights which the social scientist can offer in the environmental debate is that eminently rational appeals on the part of the environmentalists for ‘us’ to change our attitudes or lifestyles, so as to advance a general ‘human interest’ are liable to be ineffective. This is not because… ‘we’ are irrational, because the power to make a significant difference, one way or the other, to global or even local environmental change is immensely unevenly distributed. This new body of research points out that people’s values are “negotiated, transitory, and sometimes contradictory” (Redclift & Benton, 1994, pp.7-8).

Kollmuss and Agyeman (2002) created their own graphical interpretation of the interplay of factors that influence pro-environmental behaviour based on Fietkau and Kessel (1981)’s model and after reviewing previous literature. This model depicts a ‘pro-environmental consciousness’ that entails environmental knowledge, values, attitudes and emotional involvement. This ‘pro-environmental consciousness’ is embedded in personal values and shaped by personality traits and other internal (e.g.,knowledge, values, attitudes, emotional involvement, feelings, fear) and external (infrastructure, political, social, cultural and economic) factors (Kollmuss & Agyeman, 2002).

The authors emphasize that old habits form a very strong barrier to pro-environmental behaviour which is often overlooked in the literature exploring pro-environmental behaviour (Kollmuss & Agyeman, 2002). Old behaviour patterns can either be characterised by inertia to change and familiarity with the status quo or a desire to repeat the behaviour, i.e., brand / service loyalty.

The next section explores the researcher’s model and the process that was used to extract factors to test in this study.

The Proposed Model

Incorporating a model that includes all factors underpinning pro-environmental behaviour is very complex and an impossible task to incorporate in one research project. The interdisciplinary factors in this research project that could drive adoption of PPMSS are grouped into the following four overarching categories distilled from the aforementioned models: consumer psychology, financial, product and demographic. These factors are the independent variables that are the most pertinent in the context of this research project. The researcher first turned to the history of pro-environmental behaviour models to form a foundation upon which to work on. The researcher then reviewed both academic, industry and government literature to find the most pertinent and/or interesting **context specific** factors pertaining to the adoption of the PPMSS. Interdisciplinary factors enable the researcher to get a broad and comprehensive view of household energy use (Steg, 2008). This study explores intentions to adopt the PPMSS and hence it does not measure the effect the variables have on those that have already adopted the technology.

Consumer psychology factors have been included within the proposed model to replicate constructs from Fietkau and Kessel (1981)'s model addressing attitudes and values, general environmental knowledge, social norms and the consumer's perceived feedback of the ecological behaviour. Kollmuss and Agyeman (2002)'s model was also very helpful and instrumental in the selection of the consumer psychology factors chosen for this research project. The researcher has focused mainly on consumer psychology factors in order to better understand consumers' psyche in order to market the PPMSS to potential consumers effectively.

Financial factors have been chosen to address 'behavioural incentives' in Fietkau and Kessel (1981)'s model. These are more internal factors that can reinforce and support ecological behaviour such as quality of life, i.e., hardship, earnings, savings etc.

Product factors have been included to measure attitudes towards a particular behaviour, in this context adopting the PPMSS. The aforementioned model indicates that attitudes need to be product specific in order to have any correlation with pro-environmental behaviour (Kollmuss & Agyeman, 2002)(Ajzen & Fishbein, 1980).

Despite the aforementioned models not specifically including demographic factors, the literature suggests that **demographic factors** also have a vital place to play in relation to pro-environmental behaviour (Kollmuss & Agyeman, 2002). Some of the demographic factors included in this research could materialise under the 'possibilities to act ecologically' construct which alludes to the fact that people are enabled or hindered to act due to economic, infrastructural and external factors (Fietkau and Kessel, 1981).

The model adapted from the previously reviewed models and advanced and tested herein appears in figure 5. Elements comprising each of the four areas hypothesized as drivers of willingness to adopt are discussed next. Given that there are many elements within each of the four areas, rather than formally stating an individual hypothesis for each factor element the literature review is written such that the directionality of the hypothesis is implied.

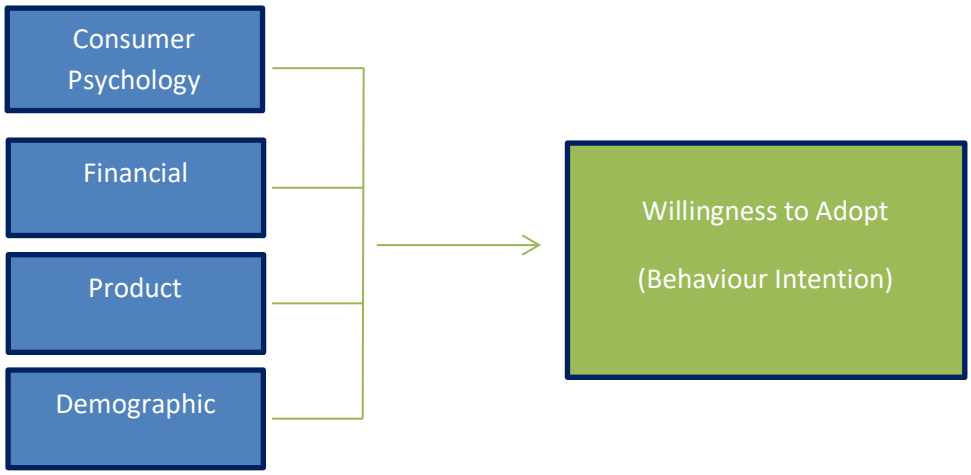

Figure 5: Determinants of Willingness to Adopt the PPMSS Pro-Environmental Behaviour Intention Model

CONSUMER PSYCHOLOGY FACTORS

Environmental Concern: Environmental concern signifies the individual's general consciousness toward the environment. Consumers with a stronger concern for the environment are therefore anticipated to be more likely to purchase products that are environmentally friendly than those who are less concerned about environmental issues (Yeonshin & Sejung, 2005). The operational measure for this construct was adopted from Yeonshin & Sejung (2005). This measure, as well as those for the following constructs, can be found in Appendix E which shows the launched Qualtrics survey and the sources of the measures that were adopted or adapted.

Environmental Beliefs: This construct will indicate the consumer's environmental beliefs by adopting measures from Gadenne, Sharma, Kerr & Smith (2011). Some studies have shown that those with stronger pro-environmental beliefs were more likely to engage in environmental oriented purchasing behaviour as beliefs shape our values and values precede pro-environmental behavioural action (Gadenne, Sharma, Kerr, & Smith, 2011). In this instance respondents were asked their level of agreement on the the belief "when humans interfere with nature it often has disastrous consequences" and "the balance of nature is very delicate and easily upset".

Awareness (Knowledge) of Environmental Problems: Environmental effects are not immediately tangible and this is often a cognitive barrier to environmental awareness. "Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. We are in many respects like the frog in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react until they boiled to death (Kollmuss & Agyeman, 2002, p. 253)." This construct will adopt Sutterlin, Brunner & Siegrist's (2011) measure of awareness of environmental problems and respondents will be asked their level

of agreement on the statement “the increasing energy demand is a serious problem for our society”. Awareness of environmental problems does not necessarily mean that this will have strong predictive power on intended action to purchase the PPMSS as has been shown by previous literature (Kollmuss & Agyeman, 2002).

Emotional Involvement: Emotional involvement is defined as the extent to which one has had an affective relationship in the natural world (Kollmuss & Agyeman, 2002). According to Chawla’s work (Chawla, 1998) emotional connection is vital in moulding our values, attitudes and beliefs towards the environment (Kollmuss & Agyeman, 2002). In addition to this, emotional involvement is the ability to have an emotional reaction to environmental degradation. Previous research has showed that women are more prone to react emotionally to environmental issues (Lehmann, 1999). Therefore, the stronger a person’s emotional reaction, the more likely the person will engage in pro-environmental behaviour (Grob, 1991). The emotional reaction is stronger when one experiences the degradation directly (Chawla, 1999). Fear, sadness, pain and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). A strong emotional investment and perceived efficacy will instigate action (Kollmuss & Agyeman, 2002). Action in this case is intention to adopt the PPMSS.

Current Energy Curbing Behaviours: This construct will measure if the respondent currently engages in household energy curbing behaviours (Wimberly, 2014). Those who currently engage in energy curbing behaviours are more likely to adopt the PPMSS.

Energy Related Home Improvements and Investments in Micro-Generation Technologies: “90% of Australians have, or would consider including, solar in their home energy mix (Ernst & Young, 2014, p. 2).” Therefore, this construct will test whether the respondent has invested in micro-generation technologies and other energy related home improvements. If consumers have then it is envisaged that they will be more prone and willing to adopt the PPMSS.

Feedback/ Knowledge: Consumers have to receive positive reinforcement (feedback) to continue to act in environmentally friendly manner (Fietkau & Kessel, 1981). Feedback can be indirect or direct.

Indirect Feedback: This construct will assess what knowledge (historical/indirect feedback) consumers are currently receiving in a post-paid billing environment by analysing the consumer's historical bill (which will not be used in hypothesis testing but will provide an insight into how consumers react when they receive their energy bill) and frequency of meter reads by consumers (Oseni et al.,2013).

Direct Feedback: "The literature indicates significant demand reduction in the short to medium term and a continued ability to develop energy literacy in the longer term from feedback. The latter is the most important 'transformational' characteristic of feedback (Darby, 2008, p. 506)" on energy use to electricity consumers. Direct feedback allows for effective action to conserve through self-regulated learning, this interactivity allows consumers to change their behaviour habits into the future. "People learn more deeply through interaction, as it is partly during this practice, and the reflection that comes during and after it, that experiences and messages are filtered and synthesised into meaningful knowledge" (Simcock et al., 2014, p. 463). Direct feedback is omnipresent through the use of the PPMSS and comes in the form of an interactive in-home display with live energy consumption data and access to an online portal (McKerracher & Torriti, 2012). In addition this per appliance feedback is an important form of direct feedback because energy consumers know little about energy use related to their behaviour (Wood & Newborough, 2003). For example, when assessing the energy use of appliances they think that energy use is related to the size of the appliance. The larger the appliance, the more energy is believed to be used (Steg, 2008).

Another interesting aspect of direct feedback could be in the form of social norm data where users can compare their usage to neighbours in the building or neighbourhood's (Petkov, Köbler, Foth, & Krcmar, 2011). Furthermore, direct feedback can also come in the form of social media competitions and sharing (Froehlich, 2009) and live energy tips (Allcott, 2011) to motivate consumers to use less energy. If the consumer desires direct feedback then they will be more likely to adopt the PPMSS.

Eagerness to Try New Technologies: The adoption of technology depends on varying levels of optimism about the technology, tendency to innovate, discomfort with technology and inherent insecurity (Parasuraman & Colby, 2007). This construct will adopt the measures from the *2013 EPRG Public Opinion Survey: Smart Energy Survey – Attitudes and Behaviour* (Oseni et al., 2013) and test consumer's perceptions when adopting new technologies. The study conducted in the UK found that the majority of respondents prefer to collect and analyse information and then weigh the pros and cons before making a decision about the adoption of a new technology. This indicates that the provision of insightful information about smart metering technology as a potential energy-saving device can influence peoples' decision about its adoption. Thus, it is predicted that early adopters of new technologies will be more likely to adopt the PPMSS.

Expectation of Others' Cooperation: Consumers are often strongly affected by social norms and by their expectation of what others will do. If consumers expect others to engage in energy conservation behaviour and make sacrifices consumers are likely to imitate this and will be more willing to adopt the technology, which in this context is the PPMSS. This construct will be measured by adapting Wiener and Doescher's items using a likert scale as also used and cited in (Gupta & Ogden, 2009). If consumers expect others to adopt new technologies and embrace new behaviours then other consumers are likely to imitate this and will be more willing to adopt the technology.

Perceived Efficacy (Locus of Control): This construct tests the individual's perception of whether they have the ability to bring about change through their own behaviour. A strong internal locus of control means that they perceive that their actions can bring about change and their behaviours are less contingent on others' behaviours. On the other hand, people with an external locus of control believe that their actions are insignificant in the whole scheme of things and these changes can only be initiated by those in powerful positions (Hines et al., 1987). Those who believe that they are able to bring change through their own behaviour will be more likely to adopt the PPMSS.

FINANCIAL FACTORS

Concern About Being Able to Pay Bill Due to Rising Energy Prices: As rising energy prices are a reality in Australia (Mountain, 2012) respondents will be asked how concerned they are about being able to pay their energy bill due to rising energy prices. This will indicate how much of a 'stressor' energy bills are for residential households. A similar measure has been used in a national Australian survey conducted by (Ernst & Young, 2014). The more stressed consumers are about paying their bills the more likely it is that they will be willing to adopt the budgeting tool that the PPMSS provides.

Current Estimated Electricity Consumption: Respondents will be asked how much their bill was for the last quarter in dollar terms at their primary place of residence, assuming they do not take the benefit of solar into account. The higher one's electricity bill, the more likely they will be to adopt the PPMSS.

Hardship: Vulnerable groups such as pensioners, those on low incomes and single parents experience the most hardship when it comes to paying energy bills (McKenzie, 2013). This construct will assess whether the respondent has experienced any hardship by seeing whether they deferred other payments to pay for their energy bill (Young, 2006), complained to the Ombudsman or Energy Provider (Oseni et al., 2013) or if they have received outside help to pay for the electricity bill. (This information is purely insightful to see if the sample of

respondents are experiencing hardship and as such seeking external sources to pay for their energy bill) (O'Sullivan, Howden-Chapman, Fougere, Hales, & Stanley, 2013). Those consumers who experience hardship are more likely to adopt the PPMSS.

Control Over Energy Expenditure (Financial Locus of Control): This construct examines the consumer's financial locus of control by assessing how customers feel in regards to managing their bill in the post-paid billing structure, i.e., bill shock (QCOSS, 2015), the consumer's understanding and preference of tariff structures e.g. TOU (Young, 2006) (this will not be used in hypothesis testing but will be used to see if consumers are aware of TOU tariffs which are commonly used with smart meters), the consumer's desired frequency of payments for energy (Fischer, 2008; Kempton & Layne, 1994) (this will not be used in hypothesis testing but will provide an insight into how regularly customers wish to be billed for their energy) and the consumer's knowledge of whether they are being billed using actual versus estimated meter readings (McKerracher & Torriti, 2012, p. 388; Pyrko & Darby, 2010), (this will not be used in hypothesis testing but will provide an insight whether consumers have knowledge of how they are currently being billed in the post-paid system).

Energy Bill Savings: Evidence suggests that an in-home display combined with prepayment initiates a behaviour change in users (Faruqui et al., 2010), which results in the reduction of energy use of up to 54% (Australian Government, 2013). Therefore, this means that the energy consumer has a financial incentive to implement a prepaid meter as it makes energy visible and audible to the consumer. Energy consumption no longer has to be out of sight and out of mind, which means that the consumer is likely to save money on their bill depending on their usage habits beforehand. Therefore, the most likely reason the consumers would adopt the PPMSS is due to a financial motivation to save (please refer to question 36 in Appendix E which assesses whether the consumer believes if a prepaid smart meter will allow them to seek the best financial rewards and savings on their energy bills).

PPMSS Price Premium: Previous research has discovered that consumers have an inherent preference to prepay for one-off hedonic consumption and to post-pay for durable utilitarian consumption (Prelec & Loewenstein, 1998) cited in (Patrick & Park, 2006). Many consumers prepay for goods and services, as this option is available to consumers as sellers are finding prepayment a viable and profitable business model. It is in the best interests of businesses to have consumers pay as early as possible(Xie & Shugan, 2001). The prepaid revolution is defusing into the energy sector in the same way it has in the financial, telecommunications, transportation and retail sector and point-of-use billing is reshaping energy transactions.

Patrick and Park (2006) found that utilitarian consumption encourages a strong preference for post payment. This article states that encouraging consumers to prepay for utilitarian consumption is an area of future investigation and as such this will be addressed in this research project. One proposed tactic is to add a strong hedonic dimension to a utilitarian product as this not only enhances or augments the functional utility derived from the product, but increases consumers' savouring and anticipation for consumption. Therefore, adding a hedonic element will mean that consumers will be willing to prepay even at a premium price. There is limited research in the marketing literature that addresses the notion of advance buying from the consumer's standpoint (Patrick & Park, 2006).

In the context of advance buying of energy, the notion of paying a premium has been embraced in Tasmania on *Aurora Energy Pay-As-You-Go* customers. This landmark paper carried out for the Tasmanian Council of Social Service is significant because predominantly urban consumers embraced the prepaid metering technology and were willing to pay a premium for the added benefits that came with the use of the solution, i.e., fair, accurate and transparent billing, when compared to the post-paid billing system. Even vulnerable customers such as pensioners and single parents wanted to pay a premium for this solution despite being inconvenienced by needing to go outside to top up the meter and to go to a local store to obtain credit and many were satisfied with the feedback

information. Therefore, it can be argued that if Tasmanians were willing to pay a premium with very basic utilitarian functions then the even more convenient PPMSS with advanced and 'fun' functionalities (hedonic elements such as, but not limited to, being able to see how much your household is using in comparison to neighbours in the builing or area, per appliance feedback, ability to create family activities and games around electricity consumption and integrating electricity usage with popular social media platforms) will revolutionise the energy consumer's experience and such they will be willing to pay a premium for this solution (Young, 2006). Therefore, to conclude it is predicted that consumers who are willing to adopt the prepaid metering solution will be more likely to pay a premium for this solution.

PRODUCT FACTORS

Perception/Knowledge of Prepayment: This construct will explore what pre-existing use consumers have had of prepaid services in general (Wimberly, 2014) and in particular their perception and past use of prepaid utility meters (Wimberly, 2014). It is reasonable to conjecture that the more experience one has with prepayment plans, the more likely they are to express a willingness to adopt PPMSS.

Convenience: Consumers need to experience convenience for the concept of a PPMSS to take off and become more accepted in Australia as this is a key barrier to the mass adoption of virtually any technology (Accenture, 2011a). This construct will explore whether the consumer is currently finding the post-paid billing environment convenient by exploring their knowledge of their current meter location (Froehlich, 2009) (Wood & Newborough, 2003), whether they have access to an in-home energy visual display (Darby, 2006a) and whether they have access to an online portal to view their usage history live, make payments and view their transaction history (McKerracher & Torriti, 2012). The PPMSS is more convenient than 'dumb' or 'semi - smart' keypad or magnetic prepaid meters where consumers have to go outside the home to replenish their energy credit. The growth in popularity of the Internet and internet enabled devices allows

consumers to top-up their energy from the comfort of their couches rather than having the only option of going to a physical store to purchase a scratch card, token or load credit on a magnetic card. The PPMSS also ensures that the consumer has an in home visual display and credit is automatically loaded once a purchase is made. The more convenience experienced by the consumer then the more likely they will be to adopt the PPMSS.

Availability of PPMSS: This construct will assess whether consumers would be willing to adopt the PPMSS from the local energy provider and / or from a third party provider so that they are able to audit the energy provider's bill. Accenture's *Revealing the Values* survey demonstrated that consumers are open to receiving and buying various electricity related products and services from potential new market players (Accenture, 2011a). If the PPMSS is available from third party providers, other than the Energy Retailers, then consumers will be more willing to adopt the PPMSS.

Distrust of Utility Providers: This construct will test the respondent's level of trust of utility providers (Pyrko & Darby, 2010). It is assumed that the more the consumer trusts the utility provider then the more likely the consumer will be to adopt the solution from them rather than a third party.

Sources of Information for Energy-Saving Advice: This construct will assess where the respondent is most likely to seek energy saving advice from, e.g., online government website, online consumer group website, online energy supplier's website, online other source, utility provider, family, friends, neighbour, sales agent, or work colleagues (Oseni et al., 2013; (Kuusela & Spence, 1999). Boardman and Darby (2000) and Green, Darby, Maby, and Boardman (1998) both highlight the importance of a recipient trusting those who are providing advice if they are to subsequently act on this advice (Simcock et al., 2014) by adopting the PPMSS in this context. This data will not be used in hypothesis testing, but will provide insight into which are trusted sources of advice for

consumers to receive education and thus influence their decisions to adopt the PPMSS.

DEMOGRAPHICS

LIVING CONDITIONS

Primary State of Residence: The respondents will be asked what State they reside in as not all States have deregulated energy markets and consumers may use more energy in some States due to weather conditions and energy prices differ per state. The researcher focused on Queensland because it is a relatively new and open-minded market in regards to smart metering. Victoria was also chosen because of the government-mandated roll-out of smart meters, this means that consumers would have had some exposure to post-paid smart meters. Tasmania was chosen because it has Aurora Energy which is the first Australian energy retailer to roll out prepaid smart meters.

Category of Residence Type: This will assess the nature of the primary place of resident of a respondent, i.e., suburban home, home in a housing estate, apartment in an apartment block of less than 50 units, apartment in an apartment block of more than 50 units, rural home, acreage, granny flat, caravan park, public housing or other.

Status of Tenure / Length of Residency: This question will assess whether the respondent is a temporary or permanent resident that owns a house, mortgages or rents their primary place of residency. It is more likely that lower income households, younger people and single parents will be renters rather than owner-occupiers. Consequently, this stifles the opportunity and motivation to make energy friendly household improvements to support changed behaviour (Fielding, Louis, Warren, & Thompson, 2009) cited in (Chapman, 2011). In contrast, owners are more likely to make the conservation of energy a priority by investing in energy efficient appliances, installing micro generation technologies and

investing in other household improvements. Owners are also more likely to take action on energy advice provided(Darby, 2006b).

Household Size: Household size has been used in previous studies to indicate differences in buying opportunities and household activities (Uusitalo, 1986) cited in (Tanner & Kast, 2003). The more people living in the household the more energy intensive the household is likely to be (Fritzsche, 1981; Verhallen & Van Raaij, 1981) as cited in (Van Raaij & Verhallen, 1983).

Family Life Cycle Status: This will determine where the respondent is in their family life cycle. Evidence suggests that households with dependent children and working parents juggle increasingly difficult schedules that are likely to impact on overall residential energy use (Edwards & Pocock, 2011) cited in (Chapman, 2011). In addition to this, energy use tends to fluctuate over the family life cycle. Younger partners without children with both partners working outside the home tend to have a low level of energy use. Households with children at home will have a higher level of energy use and households whose children have left home will have decreased energy use. However, energy use gradually increases with age as older persons need higher temperatures (Van Raaij & Verhallen, 1983). Family life cycle stages that are attributed to greater energy use are more likely to adopt the PPMSS.

PERSONAL PROFILE

Age: This question will be asked to assess which age groups of the Australian population are likely to be more energy conscious. Previous studies have found that the elderly are likely to be more aware and/or frugal (Pyrko & Darby, 2010), and thus more likely to adopt PPMSS.

Gender: "Women usually have less extensive environmental knowledge than men but they are more emotionally engaged, show more concern about environmental destruction and are more willing to change" (Fliegenschnee & Schelakovsky, 1998) (Lehmann, 1999) cited in (Kollmuss & Agyeman, 2002). Therefore, females are more likely to adopt the PPMSS.

EDUCATION AND EMPLOYMENT

Highest Level of Educational Attainment: This will assess how qualified the respondent is as it has been found that extensive environmental knowledge increases with years of education (Kollmuss & Agyeman, 2002). However, more education does not necessarily translate into pro-environmental behaviour.

Employment Status: This will assess whether the respondent is in paid employment (full-time >= 35 hours or part-time <= 34 hours), paid self-employment (full-time >= 35 hours or part-time <= 34 hours), not in paid employment or retired. According to a study many Australians report intensified work and more than one in five Australians work more than 48 hours per week. Consequently, this means that Australians are increasingly time poor and more likely to prioritise comfort over sustainable living (Edwards & Pocock, 2011) cited in (Chapman, 2011).Those who work greater than 48 hours per week are less likely to adopt the PPMSS.

Annual Household Gross Income Before Tax: This will assess what the respondent's annual household gross income. Brandon and Lewis (1999) found that higher income is correlated to higher energy consumption and higher environmental awareness (McKerracher & Torriti, 2012). In addition to this, higher income strongly impacts the investment behaviour of households with regards to home insulation and solar energy. Therefore, higher-income consumers are more likely to adopt the PPMSS.

Dependent Variable

Willingness to Adopt PPMSS: Single item measure that assesses the consumer's willingness to adopt the PPMSS. Willingness is assessed rather than 'intentions to adopt' because the PPMSS is not a universally available option for consumers.

Chapter Three: Research Method Design

This research study involved implementing a mixed method design. Combining quantitative and qualitative methods can lead to stronger inferences and enhance the overall knowledge of a research issue (Rohm, 2006).

The first portion of the study involved a focus group of nine respondents, which was conducted in a boardroom at Bond University. In addition to this, 13 written qualitative interviews, which mirrored the questions asked in the focus group moderator guide, were also collected. Respondents were recruited at the Bond University Open Day and were of various ages (all over the age of 18 years old), genders, and incomes, resided in Queensland and were primary energy bill payers at their primary place of residence. Therefore, this array of demographic backgrounds allowed for insightful perspectives for the first qualitative portion of the study (refer to Appendix F for the qualitative research transcript). Qualitative research is enlightening because it can complement statistical findings by being "a source of rich descriptions and explanations of lived experiences (Rohm, 2006, p. 31)." The first portion of the study enabled the researcher to present some visual stimuli to the respondents for clarification and amendments, prior to its inclusion in the online survey (please see a copy of the Piktochart in Appendix F, prior to amendments for the survey).

Figure 6: Mixed Method Research Design

Recruitment of Panel Sample

The Qualtrics online panel allowed for the systematic data collection from a 'sample' drawn from the Australian population i.e. panel participants who volunteer to take surveys.

Qualtrics endeavours to ensure the quality and representativeness of their online samples by targeting and engaging participants from social media networks, online communities and a vast array of websites by using banners, invitations and messaging of all types.

Prior to being included in any sample every panel participant had to pass through quality controls by sharing extensive personal, background, demographic and psychographic information. This allowed Qualtrics to match the desired consumer demographic for the survey of this project.

In order to avoid self-selection bias Qualtrics never disclosed any project details in the initial invitation to "take a survey" these details were only disclosed later once they selected to take the survey.

Screening Criteria, Sample Size & Sample Composition

A "consumer" for the purposes of this research investigation is a person that:

1) Is an Australian resident that resides in Victoria, Queensland or Tasmania;
2) Is primarily responsible for paying the residential electricity bill at their primary place of residence; and,
3) Is over the age of 18 years old.

This energy 'consumer' is likely to be the gatekeeper of the household. They are the 'actor' of the household who are likely to have the most decisional power and the most potential to implement changes in the household that initiate behaviour changes that are pro-environmental i.e. adopting the PPMSS.

The sample (n=210) was conducted over the three Australian states of Queensland, Victoria and Tasmania. The researcher focused on Queensland

because it is a relatively new untouched and an open-market in regards to smart metering. Ergon Energy is a retailer in Queensland who has implemented prepayment meters which are not bi-directional AMI smart meters but rather card operated meters for customers living in more remote areas. Victoria was chosen because of the government-mandated roll-out of smart meters, this means that consumers would have had some exposure to post-paid smart meters.

Tasmania was chosen because in this region there is Aurora Energy, a forward thinking energy retailer who rolled out a Pay-As-You-Go option for consumers in Tasmania. Consumers in this region embraced this technology and were willing to pay a premium for the added benefits that came with the use of the solution, i.e., fair, accurate and transparent billing, when compared to the post-paid billing system. Even vulnerable customers such as pensioners and single parents wanted to pay a premium for this solution despite being inconvenienced by needing to go outside to top up the meter and to go to a local store to obtain credit and many were satisfied with the feedback information (Young, 2006).

The researcher aimed to recruit a sample approximately in proportion to the size of the general population in each state, as it is difficult to ascertain the population of household decision makers in each state. Despite its size geographically Victoria has the largest population at 5,866.337, then Queensland at 4,740,900, then Tasmania at 515,000 (Australia Bureau of Statistics, September 2014).

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Victoria	109	51.9	51.9	51.9
	Tasmania	12	5.7	5.7	57.6
	Queensland	89	42.4	42.4	100.0
	Total	210	100.0	100.0	

Table 1: Geographical Distribution of Sample for Survey

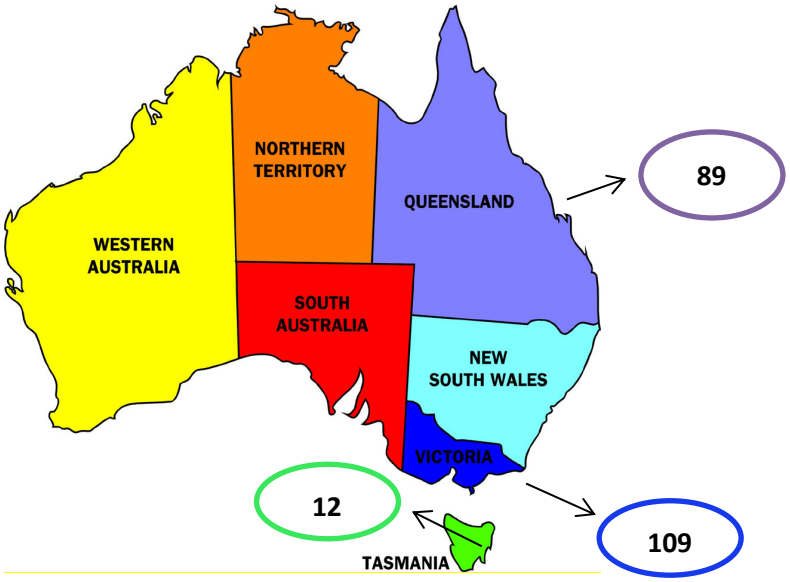

Figure 7: Geographical Distribution of Sample of Australian Respondents

The age distribution of the sample is presented below. The majority of the sample was from 51 - 60 years old, then 61 - 70 years old and then 41 - 50 years old.

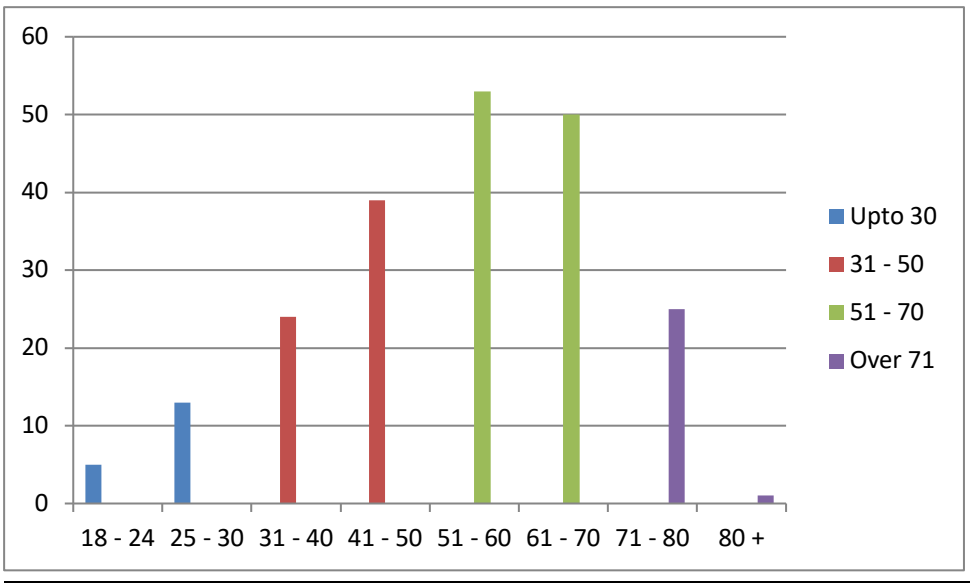

Figure 8: Age Distribution of Sample of Australian Respondents

The primary place of residence of the respondents within the sample is presented below. The three most common categories of tenancies in respective order were suburban homes, residing in an apartment block with less than or equal to 50 units and residing in a rural home.

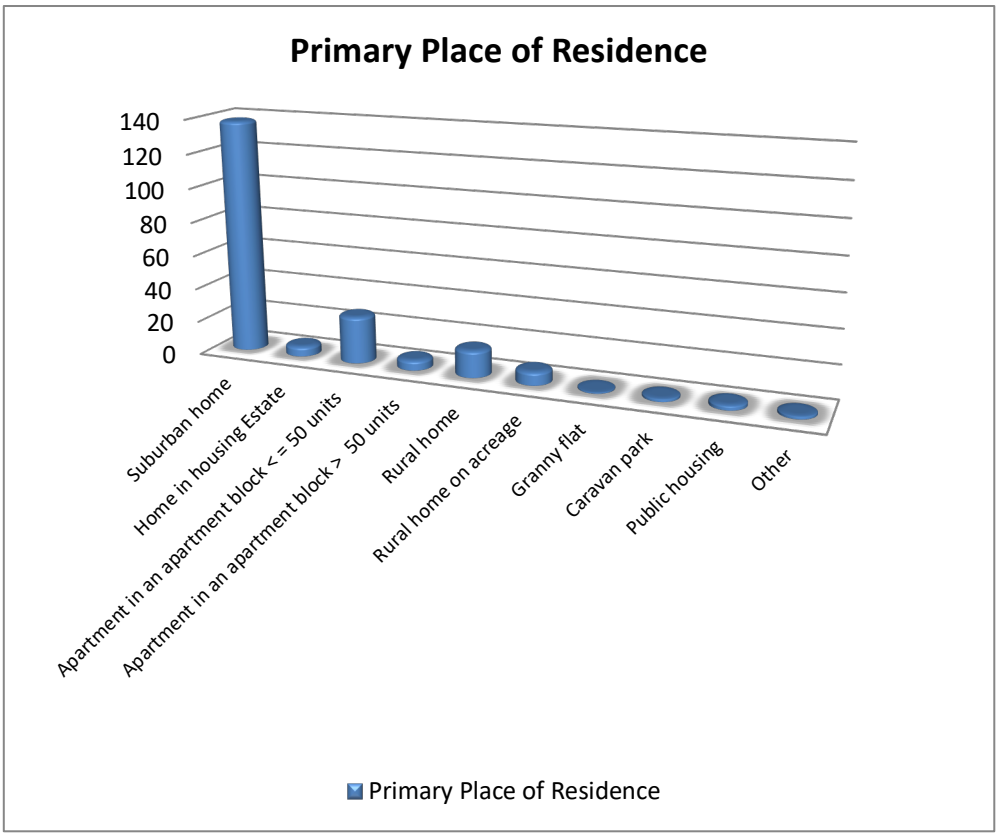

Figure 9: Primary Place of Residence of Respondents

Launch of Survey

Qualtrics first collected approximately 10.00% of the total responses and then the study was paused to ensure that the data appeared satisfactory for this research project, notably that there was variance within the various variables and underlying distributions were not alarmingly skewed. At this stage, the researcher found that they did not need to make changes to the questionnaire as it was tested and timed in a pre-test with colleagues and any required amendments were made before the survey was submitted to Qualtrics.

The researcher provided a survey to Qualtrics and were assigned a project manager who was responsible for the panel integration, set up of redirects, screening questions, attention filters, forced responses (to avoid missing data) and quotas. The researcher requested that attention filters (refer to Appendix E

questions in red font) were incorporated in the survey so that the researcher received quality data. For example, some of the attention filter questions were:

1) "We want to ensure that our survey participants are paying close attention to each question. Please select "other" and type the word "survey" in the provided text box.

   - Not at all like me
   - Not much like me
   - Somewhat like me
   - Quite a lot like me
   - Just like me
   - Other

"Survey" – (One respondent noted "a good survey and honest one").

2) Respondents were next asked to "select extremely important for this statement" because many respondents experience fatigue when there are a battery of questions in one block with the same scale measures, e.g., not at all important to extremely important.

In addition to this, the project manager was able to filter fraudulent survey takers who quickly straight-lined through the survey. Any respondents who failed the screening and attention filter questions were excluded from the sample so that they did not compromise the researcher's data analysis and additional surveys were taken until the sample size reached 210.

According to the data provided by Qualtrics, there were 210 completed surveys and there were 182 early terminated responses which were screened out because respondents either did not complete the survey, did not qualify the screening questions or they failed the attention filter questions.

The field time to conduct the survey was 5 business days for a 15 – 20 minutes survey. The researcher was able to monitor the live results during the entire data collection process.

The online survey tool was particularly useful to embed visual material (refer to Appendix E) and the respondents benefited from having time to think through the questions without being pressured. The project manager also incorporated a timer for this question to ensure that respondents were spending the time to digest the differences between the two options being examined in this research project, which further ensured the quality of the survey responses. In addition to this all surveys were conducted in the same manner online.

Each complete response costed USD $7.00 (inclusive of the project management service and the costs of any incentives provided).

Incentives

Qualtrics tailors incentives to satisfy different respondent motivations. Incentives include cash, prizes, points or a donation to charity. Alternatively, other respondents may just desire a learning experience by participating in the study and contributing their opinions about a product or service of the future or they simply may just want to help. The researcher had no control over the incentive structure offered by Qualtrics.

The potential disadvantage of panels are that the data collection may be compromised due to panel respondents who use numerous e-mail addresses and/or false identities on various computers to take surveys with the aim of receiving multiple incentives.

Launched Survey

Refer to Appendix E for a copy of the launched survey.

Chapter Four: Qualitative Data Overview

The first portion of the study was conducted to refine the survey and to perceive views on utility billing and prepayment. The study first delved into one focus group of nine respondents at a boardroom at Bond University. In addition to this, as some respondents could not attend but were still willing to participate another 13 were asked to complete a qualitative written interview, which mirrored the questions asked in the moderator guide for the focus group.

Respondents were of various ages (all over the age of 18 years old), genders, and incomes, resided in NSW or Queensland and were primary energy bill payers at their primary place of residence. In terms of the gender distribution, there were 11 male respondents and 11 female respondents. (The respondents have been coded by gender for the purpose of reporting responses). Therefore, this array of demographic backgrounds allowed for insightful perspectives for the first qualitative portion of the study. In addition to this, by also conducting the written interviews this meant that the researcher received many insightful responses that were not swayed by groupthink. Also, respondents were not deterred to contribute and articulate their true opinions, which may also be the case in a focus group setting (refer to Appendix F for detailed qualitative research transcript).

The respondents were asked questions from the moderator guide, which guided them through the following three key topic areas:

- ***Topic One:*** Feedback (direct and indirect)
- ***Topic Two:*** Financial control
- ***Topic Three:*** Perception of prepaid purchases/services and perception of prepaid utility metering specifically.

The qualitative research process is enlightening because it can complement statistical findings by being "a source of rich descriptions and explanations of lived experiences (Rohm, 2006, p. 31)." In addition to this, the researcher intended to first conduct *exploratory* qualitative research before launching the online survey to understand consumers' perceptions and to create an opportunity to provide

respondents with graphical stimuli of the main differences between the traditional post-paid billing model and the prepaid model, a graphic which was amended in response to the qualitative feedback and then was incorporated in the survey (refer to Appendix F). The researcher wanted to ensure that online respondents taking the survey would clearly understand the differences delineated within the two options depicted as prepaid meters are a relatively new concept in Australia and not all Australians are aware and educated about this offering. Furthermore, the researcher also wanted to test how respondents would react to certain questions incorporated in the survey prior to launch. Upon conducting the qualitative research it was found that some changes had to be made to the graphic prior to the launch of the survey.

What follows are the questions asked of participants and a partial transcription that captures the essence of their responses. The researcher's interpretation of their responses is summarized at the bottom of each question.

Topic One: Feedback (direct and indirect)
How do you currently receive your Energy Bills? – Online or Post / Body Corporate or Energy retailer? Most respondents received the energy bill by post from an energy retailer. F10 (female number 10 of 11) mentioned that she receives her utility bill from Metered Energy (an embedded network utility management company) as she lives in a Body Corporate environment. F11 mentioned that she has a prepaid meter which has electricity provided by the management in a site on the Gold Coast, they provide an allocated 'fair usage' amount as part of the rent and if they exceed the allocated amount they are then able to purchase more electricity online. Some respondents also mentioned that they receive their energy bills online, which shows that consumers should be presented with both options to receive their utility bills.

What are your likely actions when you receive this bill? (Do you read the bill carefully? Is it easy to understand? Do you change your habits of energy use?)

F3 (female number 3): “Yes I read the bill. It is relatively easy to understand. Yes, in the fact of making sure that lights are turned off when leaving a room and making sure power points are switched off. No, in the fact of switching power plugs off, the kettles, dishwashers, washing machines and hair dryers.”

F5: “I look to see how many KWHS I have used and also what the daily supply charge component is. I like to compare my usage against my last bill so that I can monitor whether I have used more or less over different quarters and seasons however often this is too late. I do try to educate my family to use less once I have this knowledge. I think it is a good lesson for my children to know from young to conserve resources. The daily average usage details are a useful indicator on the bill I think and the historical graph. However, I think it would be useful to have live rather than historical feedback on energy consumption. As history is often the past and you can’t change how much you have to fork out of your hip pocket.”

F7: “Yes, I read the bill and compare it with previous bills. Sometimes, I try to change my habit of energy usage but it is really hard and unsuccessful.”

F8: “Yes I do look at it, not that very easy to understand due to language they use, I assume that they are correct and then I pay.”

F9: “Yes, not that easy to read but I do look at it. I am conscious; I tend to use my appliances more on low peak periods.”

F10: “Yes, I look if it has gone up or down sort of month to month. In terms of how it is made up it is not very clear to know where it is coming from.”

F11: “Having the prepaid option provides the opportunity of viewing usage and controlling it.”

M1 (male number 1 of 11): “Yes I read my bill carefully. The bill is relatively easy to understand. Yes we change our habits in summer and in winter. We have solar panels but the electricity bills vary a lot. Sometimes we would get a credit of $100. Other times I have to pay $500. We now do a lot of our washing and cooking at night to save electricity.”

M4: “I read the bill to confirm the readings are accurate and the total adds up to the agreed value. The bill is not easy to understand, as there are multiple tiers and times that each tier operates. We do not change our energy habits, as the bill is considered excessive.”

M5: “I usually check my consumption with average usage as well as last period consumption. If it is higher than average I will try to use energy more efficiently.”

M7: “It isn’t easy to understand, doesn’t explicitly label what I am paying for, and I find it difficult to interpret the bill. The only component I can understand is the bar graph visually showing my usage patterns.”

M8: “We probably only look at what we owe and check what our solar contributions have been for that period. We do not adjust our usage.”

M11: “I would give it a quick look and only consider it in detail if the bill was substantially different from what I expected.”

Summary: These responses indicate that consumers do not necessarily change their habits after receiving an energy bill as many have learnt to expect a high, confusing and abstract bill which shows total usage, rather than broken down usage. The graphical comparative averages assist them to benchmark how they are doing in comparison to social norms in the area. However, the quarterly billing cycle means that the adjustment of energy usage can be too late and backward looking.

How often do you check the meter reading of the meter supplied by your energy supplier and where is this meter located and is it easily accessible?

F1: “Never, but now I might have to have a look now.”

F3: “Having only lived in the resident property for 8 months (started December 2014), the meter was checked initially and then in June 2015. The meter is located on the side of the house as you enter to the back of the property and is very accessible.” This respondent lives on a rural property.

F4: “Never – not easily accessible as it is located outside of the property.”

F5: “I never check it I know that it is outside my home and it is like a ‘boy’s toy’. I am pretty sure my husband checks it once in a while.”

F6: “The electricity meter is not easily accessible. The gas meter is on the side of the house but in the garden. I do not check them.”

F9: “Mine is easy accessible just outside of the house, I never see the meter reader that comes to the house.”

F10: “I live in an apartment and I don’t know where it is located so I can’t check it.”

F11: “N/A we have a sub-meter, which we can see in the residence, I assume the Body Corporate and management have a meter from energy supplier to view the total building’s usage.”

M4: “Never, the meter is locked behind a door that landlords and meter readers only have the key for.”

M6: “Never. I don’t even know where it is located.”

M7: “I don’t physically check the meter and I don’t know how to. I am not sure where the energy meter is located.”

M8: “We do not check our meter and it is positioned about 150 metres from our house, which is on a farm.”

M10: “I don’t, it’s not easily accessible.”

Summary: These responses indicate that consumers rarely or never check the reading on the main meters provided by energy retailers. Many consumers do not know where their meter is located. In addition to this, checking the meter can be an impossible task for residents who live in Body Corporate environments where the meter is not easily accessible and locked away in a utility cupboard.

Topic Two: Financial Control

Most people receive a bill every quarter after they use electricity; under this current system do you feel you have control in the management of your electricity usage?

F1: "No."

F2: "Yes, to a certain degree as I always turn off appliances/lights that are not being used so we don't use electricity unnecessarily."

F4: "No because I receive the bill every quarter so don't really know what my consumption is until I receive my bill. Furthermore, receiving the bill on a quarterly basis and not on a monthly basis - one tends to forget about their electricity usage."

F5: "No, I do not feel like I am in complete control of my usage as energy is often out of sight out of mind and I use it while I do other necessary tasks. The issue is that I am conservative and often switch off lights but I cannot necessarily always control the behaviours of my other family members and guests when they stay over."

F6: "Receiving a bill every quarter does not make me feel in control of my electricity usage. In this way it is hard to estimate which appliance is mostly contributing to the bill."

F8: “No, I don’t know what I am using the most, which I would like to know, and then I could control the electricity better, from dryer, dishwasher etc.”

F9: “No, you use your electricity and the bill comes afterwards so you do not have control of what you are spending.”

F10: “Mine comes every month but it does not give much control. It is not on a set day it just comes in that month.”

M1: “I don’t feel like I have control. Monthly would be better.”

M4: “No, there is no management through this process. The only way to have control is to have a live feed of used electricity.”

M5: “Yes, I can manage it for the next period.”

M7: “I don’t feel very in control with the meter usage system and the only control I feel I have is seeing my usage pattern in the bar graph.”

M8: “Yes we have always had the same system so I suppose our level of control has always stayed the same.”

M9: “No. Too long in interval to change habits. If people can get real live data or set more appropriate - short time targets - easier to change habits.”

M11: “Yes, even though I’m not sure how much the bill will amount to? Being in control of energy use is about having the right habits, e.g. turning off lights when leaving the room.”

Summary: Most consumers felt that they do not have control in the post-paid billing system. A more regular billing cycle will empower consumers to feel more in control. The bar graph on the bill (historical data) helps consumers control and gauge their usage. This indicates a thirst for feedback data.

How do you react when you get the bill? Are there any surprises?

F2: “Sometimes it is a surprise with the amount.”

F4: “Sometimes astounded when the bill is dramatically higher than what I expected it to be.”

F5: “I used to get shocked by the rising prices but I mitigated that by installing solar panels at my residence before the feed in tariff rules were changed.”

F6: “I don’t usually get surprised about the bill. I most likely **expect** a high bill not to get disappointed.”

F8: “It has gone up because I have been using the heater lately. My bill is usually $200 was $400 this time!”

F9: “Electricity prices are going up!”

F 10: “Prices keep going up doesn’t seem to be a system to know how much it is going up by.”

M1: “Most of the time there are surprises. We have solar panels and the credits change all the time. Something we don’t even get any credits.”

M3: “No, I actually I look forward to seeing it now due to solar.”

M6: “Oh great the electricity bill is in. How much is it this time? I don’t feel that surprised when I get them.”

M7: “Not particularly, I see a bill of usually around $100 per quarter.”

M8: “We always expect a larger bill during the winter months and unfortunately we are always expecting power to go up in price.”

M11: “So far, no surprises. I expect there might be some after the winter period when we use electric heating quite a bit.”

Summary: There seems to be a consensus amongst respondents that energy prices are increasing and some consumers have desensitised themselves to expect high bills as the norm and as such some do not experience ‘bill shock’. The installation of solar panels has acted as a ‘Band-Aid’ for bill shock and

some consumers look forward to receiving their bill to see what credit will apply. Consumers expect a higher bill due to the use of heating in Winter months.

Are you currently being billed using actual or estimated meter reads?

F4: “Actual (I think).”

F5: “I would hope that I am being billed actual meter reads however I don’t think this is the case because I have never seen a meter reader come to my house. This is worrying and I would like to pay for what I use.”

F9: “I think it is actual but can’t guarantee it. I never see reader come read the meter.”

F10: “Mine is actual but I don’t actually see them come but it says on the bill that they come. I am with Metered Energy and they charge for hot water and electricity.”

M5: “It is based on actual meter reads.”

M6: “No idea. Probably estimated.”

M8: “As far as I understand it is an actual reading as we have someone check our meter.”

Summary: Many consumers are uncertain as to whether they are being charged based on actual or estimated usage. Some respondents mentioned that they do not see someone checking their meter.

Are you familiar with your electricity tariff structure?

F1: “Not at all, I would have to guess.”

F5: “Yes, I am on a fixed tariff and then there is also a daily supply charge. I think it is good that Queensland has a gazetted rate so that energy retailers can’t charge past that price cap!”

F6: “I have a superficial knowledge of it.”

F9: “Yes, I know when peak periods are etc.”

F10: “Stepped tariff, but we did not get given any other options through Metered Energy.”

M1: “Not entirely sure.”

M8: “I have a vague idea but don’t understand it fully.”

M11: “Yes, I have read it but having peak and off-peak tariffs doesn’t change the pattern of my electricity use.”

Summary: Not all consumers have a clear understanding of their current tariff structure.

What is your preferred tariff structure (fixed rate, inclining block or time-of-use)?

F1: “Fixed is fine.”

F4: “Time-of-use.”

F5: “I would say time-of-use, as I would take the effort to put my appliances on e.g. dishwasher and washing machine at off-peak periods. “

F11: “I think the best is fixed rate.”

M3: “Fixed rate is better.”

M4: “I prefer fixed, as our meter is and old version with the horizontal wheel.”

M5: “I prefer fixed rate. We are not home during the day and usually use electricity at nights, which would be more expensive in time-of-use structure.”

M6: “I don’t really know what inclining block means. I see cost saving potential with time of use tariffs over fixed rate but I have never had the opportunity to take advantage of them as I’ve always rented.”

M8: “I suppose a fixed rate allows you to have an idea of how much you are using but a tariff on your most used items would be good.”

M9: “Fixed rate – to avoid confusions and errors made with billings.”

M11: “I’m OK with the fixed rate but I don’t know what the other two options are.”

Summary: Some consumers find the comparison of tariff structures confusing and cannot accurately ascertain which option is best for them. Most consumers seemed to opt for a fixed rate (perhaps due to the simplicity of this tariff structure).

Do you currently have access to an in home visual display which tells you how much you are using live or access to an online portal to view your transaction history online?

F5: “No, but I do have access to a monitor that shows me how much solar energy I generate that is informative.”

F8: “No, just download the PDF file to pay through my e-mail no account and can’t access past bills, if I do I have to call them to ask them.”

F9: “Yes, I have a sub meter installed at my home with a meter display, which tells me what my usage is. I can go online and view transactions.”

F10: “I don’t have an in-house display. You can see all past bills in one place through an account. They don’t update it as regularly as they should (I think it is an average they say this is an estimate) and online is pretty hard to read. I would prefer to have a live data feed on the display and on a portal of what I am using.”

F11: “Yes, the visual display shows the balance of electricity left.”

M1: “No, but that sounds great.”

M6: “I’m not sure. I’ve never used it if I do.”

M7: “I do not.”

M8: “No, never had.”

M11: “Yes, online account.”

Summary: Most consumers do not have access to an in-home display which tells them how much they are using live or give them access to an online portal to view their transaction history online.

Topic Three: Perception of prepaid purchases/services and perception of prepaid utility metering specifically

What does prepaying vs. post paying mean to you? (Please explain in your own words)

F1: "Prepaying means ***buying credit to use down*** then re-buying. Post paying means consuming (possibly without thought) then having to pay."

F2: "Prepaying: Prepay a ***certain amount of which you estimate you will use***. Post paying: Paying for what you have used."

F3: "Prepaying: it **is *proactive*** as I am in control of my energy usage. Can budget the expense (have greater certainty of the cost) and spread my usage to last longer. Post paying: it is reactive by which the expense has already incurred and cannot reduce the amount of the energy usage that has already been consumed."

F4: "Pre-paying: Means having a ***defined cap budget*** so that I am in control of what I spend by paying upfront before I consume a good or use a service. Prepayment could be for an entire balance or an upcoming payment. Post-paying: Means having the luxury to pay later after a good or service has been consumed or used. I believe the consumer is less in control this way and tends to spend more."

F7: "Prepay mean ***pay before*.** Post pay means pay after your usage and means arrears/late payments."

F8: "Prepaid gives you ***more control*** over what you use, it is more transparent. Post-paid is after the event and you can't do anything about it whereas prepaid you can."

F9: "Prepay means your ***pay upfront and keep your eye on it*** to see if you want to top it up. Post pay means one payment whereas prepayment could be multiple payments."

M1: “Prepaying means that you pay in advance for the electricity you ***anticipate*** you will use. This is similar to prepaid mobile phone credit, for example if I only want to spend $50 this month for my mobile phone. I buy credit for $50. Post-paid means that I can use as much electricity as I want and at the end of the cycle I will get billed for it. I don’t like this because I always spend more than I planned.”

M3: “Prepaying means to me that I pay for the energy before I use it, the benefit being that I am ***more aware of my usage*** rather than receiving one large bill every quarter.”

M4: “Pre-paying is ***paying forward money for an allocated amount of electricity*.** The allocated amount does not change for that prepay period. Post pay is essentially paying for what you use, after you use it.”

M5: “When you prepay there is ***no compulsory monthly payments, you can't over-use unless you top-up*.** In post payment, there is sometimes a lock-in contract and you will not be informed of your overspend till you receive your bill.”

M11: “Prepaying means I ***limit the risk of high bills from intentional or unintentional excessive use*.** It also means ***no commitment to one provider*** and ***easy switching*** when better plans become available.”

Summary: The bolded-italicized words are informative definitions/associations of prepayment through the eyes of the qualitative research participants.

What are typical prepaid plans or services that you have used before? Do you like them? Why?

F2: “Phone credit, gift cards. They have their benefits, as you **don’t go over your cap** or specified amount.”

F3: “Prepaid phones. Not keen on them because the **service gets cut off after the limit is reached and it becomes a pain to get pre-paid credit.”**

F4: “iTunes, pre-paid phone, tollgate (transports). Yes, because it is a **fixed cost and eliminates the risk of exceeding your limit.”**

F5: “My gym membership, petrol, groceries, take-a-way food, my lawyer made me pay in a trust account before they completed the service, train ticket, online shopping, visa application.”

F6: “I use phone prepaid plans, prepaid bus card, Skype credit. I do like them as **I feel more in control** of what I spend for these services.”

F8: “Petrol is prepaid or cash buyer of a car. Gift voucher for massage and spa package to Versace for a year, I didn’t use it and then it expired! Depends on what it is, I like using prepaid on phone so I **do not have to commit to a plan and I don’t get a scary bill**. My friends have had $1000 - $2000 bills for their phones!”

F9: “Telstra mobile cards, groceries, and insurances you pay in advance (instalments) and tollgate. I like them because **you can monitor your spending more**.”

F10: “Internet wireless, Go Card to Brisbane on train. Depends on what it is for, you might not use it until long time down the track. **If you are going to use it straight away and regularly then it’s good** but if you are going to use it down the track, then you are out of pocket and then you might not even use it!”

F11: “Prepaid phones, prepaid metro card. Yes, I do like them because it is more convenient and it provides record of my usage. **It defines the limits**.”

M1: “Gift card (Myer), prepaid phone, Skype credit, Go card – great idea because you can **plan ahead and be fiscally smart.**”

M4: “Mobile phone, tollgate, public transport, iTunes. I used them because it is the only way to use those services and I know there is **security** in what I can

purchase without blowing out the budget. The problem occurs when I need to recharge, as there are limited places to recharge or silly minimal top up amounts (i.e., Sydney road toll is $80)."

M5: "Prepaid phones. I didn't like it because it was **more expensive** that post-pay plans."

M10: "Gift cards, mobile phones, Skype credit. They are OK and you can **easily gift/transfer credit** for the purpose of what giver intended unlike cash could go anywhere."

M11: "I have previously used prepaid gift cards, public transport passes, Skype credit. I also put fuel in the car before I use it rather than after. **Assuming the same rates, I prefer prepayment over post-paid plans.** For example, I continue to have a prepaid plan for my mobile phone because it's **cheap, simple and I'm very happy with it."**

Summary: Many consumers have used prepaid services before in other industries and have enjoyed using them for example: prepaid MYER, iTunes and massage gift cards, prepaid mobile phones, gym memberships, petrol, groceries, take-a-way food, transportation (bus and train tickets), online shopping, visa application, cash buyer of a car, lawyers who make you put money in a trust account upfront.

Prepayment is often a premium service and as such this can dissuade consumers to use these products, such as phone plans.

F10 stated that when purchasing prepaid goods or services, it "depends on what it is for, you might not use it until long time down the track. If you are going to use it straight away and regularly then it's good but if you are going to use it down the track, then you are out of pocket and then you might not even use it!" Therefore, essentials such as groceries, fuel and utilities would be used straight away and as such would suit the prepaid option.

Are you aware of prepaid electricity? (Please describe in your own words)

F2: “No.”

F3: “Yes, a system installed in your property which allows you to pay upfront for electricity and heightens the consumer’s attention in regards to their usage.”

F4: “Yes, I have heard about it but have limited knowledge.”

F5: “Yes, one has to pay for their energy prior to consuming it. The system would deduct the credit downwards and then you have to pay more, rather than a cumulative meter reading in a typical post-paid system.”

F6: “No, I haven’t heard of it before.”

F11: “Yes. This would be where electricity is purchased in advance before usage rather than using and then being billed.”

M1: “Yes I am, they have them in South Africa. It is the concept of paying in advance for electricity you anticipate you will need.”

M2: “Yes, and it is a good idea. Aurora Energy in Tasmania offer them I think.”

M4: “No, not by the major suppliers.”

M6: “No. This is the first time I’ve heard of it.”

M10: “Yes, I have seen them being used in New Zealand where I am from.”

M11: “I have used prepaid electricity in the UK before. I wasn’t aware this option was available in Australia.”

Are you aware of smart meters? (Please describe in your own words)

F1: “Yes, only the name.”

F3: “Yes, but I have not investigated them in detail.”

F5: “Yes, these are meters that are intelligent in the way that they have live data so energy providers do not have to arrange for meter readers to come to the home. If properly packaged and presented, advanced metering data can be a powerful tool to educate consumers.”

F9: “Yes, it is advanced metering infrastructure.”

M1: “No.”

M2: “Yes and it could be useful if correctly implemented.”

M3: “Yes we have a smart meter installed with the system.”

M4: “Smart meters by way of the big electricity companies as they can charge for the on and off peak rates.”

M6: “Yes. I’m not really sure what the smart means though. I assume that it saves the energy company money by not having to pay somebody to inspect old meters.”

M7: “I have heard of them but don’t know the full description. They have more efficient technology to more accurately measure your energy consumption.”

M11: “No, I’m not sure what they are. I guess it they might be electronic devices that measure energy consumption and are complemented with an online/mobile service presenting up-to-date energy use information and facilitating credit prepayment. Possibly smart meters could include extra information on use per device or environmental impacts (carbon emissions).”

Summary: Consumers are somewhat aware of smart meters but aren’t entirely sure what makes them ‘smart’. M7 mentioned, “I have heard of them but don’t know the full description. They have more efficient technology to more accurately measure your energy consumption.” Furthermore, M11 states, “I

guess they might be electronic devices that measure energy consumption and are complemented with an online/mobile service presenting up-to-date energy use information and facilitating credit prepayment. Possibly smart meters could include extra information on use per device or environmental impacts (carbon emissions)."

Does the idea of prepaid smart metering electricity interest you – why or why not?

F1: "Possibly. Of course, only if it's cheaper in the long run."

F2: "It would have to have a good benefit to our household to have us switch. Also, the cost in investing in this would have to be beneficial. Probably wouldn't interest us at the moment as we are renting, but maybe when we buy our home."

F4: "Yes – because there are no contracts and no bills. You can constantly monitor your energy usage and if one requires more electricity, there is freedom to top-up when needed."

F5: "Yes, I am someone who likes to be in control and conserve our precious resources. This will enable me to take action and reduce my energy costs without waiting for a bill to arrive later. I would particularly want this in my investment home as tenants often abuse the privilege of utilities included in the rent particularly in mine where I found out that the sub-leased the premises without my consent! I also like the certainty and control over disconnection. The paradigm of disconnection shifts from "you turned my electricity off (a customer disconnects for failure to pay past due amounts)" to "my electricity ran out (prepayment balance of zero)." This by default makes consumers more accountable and they will conserve more energy this way. There will be a spirit of cooperation rather than blame, particularly in lower income demographics. I think prepaid meters would also be a great arrears management tool for energy providers without requiring total disconnection of services."

F6: “I would like to know what this is about, as I like being in control of my expenses.”

F7: “Yes, if it helps me to manage my energy usage.”

F8: “Yes, I can control how much I use and what I am using the most and then can adjust my habits. You have to just trust the Energy Company on what you are using when you enquire. No way to fight and audit the bill if there is an error, which is annoying.”

F10: “Interested to see how much each appliance is using and it is good to have the live feed.”

F11: “Yes it does. It is an innovation in this industry and it would be interesting to see how it is received in the market.”

M2: “Yes it does. It is good to be given the option at the very least.”

M4: “Yes, for a renter it does as it allows me to budget and know what I have to use.”

M6: “No not really, I feel that I’m in control and can manage my household’s expenses as they are due and it is better from a cash flow point of view. This would be a different story if I were a low-income earner and found it difficult to manage larger bills.”

M8: “No not really, I would just prefer to pay for what I have used unless there is some form of financial saving.”

M10: “Yes, allows for better monitoring and controlling of energy consumption and consequently the opportunity to reduce energy bills.”

M11: “Yes, it does. I would prefer prepaid utilities with current information on use and remaining credit available online or on a mobile device.”

Summary: Most consumers would be willing to adopt the prepaid billing solution if it is proven to be cheaper and save the consumer in the long run, if

there are no lock-in contracts and bills, if it helps consumers manage their electricity usage and feel more in control, if there is integration to online platforms and mobile devices and it helps them make sure that their bill from the Energy Retailer is accurate.

Tenants are stifled to implement energy efficient home improvement investments, even if they desire to.

Have you ever used a prepaid electricity or water meter before? (What country, method and utility)

F4: “Never.”

F5: “Yes, a coin operated one in England when I was younger. This was for a gas meter I remember I would top it up to make sure we were not in the cold when it snowed. These days there are magnetic card and token operated systems so they are more sophisticated. I came across many of them in my travels to South Africa and Bali too.”

F6: “No, I haven’t.”

F9: “Yes, Australia.”

F11: “I am not sure if the one I am using currently is prepaid but we have to purchase online which means we pay before we get the electricity. Gold Coast, at Varsity Towers.”

M3: “Yes, there are some on the Gold Coast in student accommodation.”

M7: “I haven’t.”

M10: “Yes, I have used coin operated electricity meters in England in the late nineties.”

M11: “England, electricity.”

Summary: Some respondents are aware of prepaid meters in foreign regions. F5 remembered using a prepaid system in England, “… a coin operated

one…when I was younger. This was for a gas meter I remember I would top it up to make sure we were not in the cold when it snowed. These days there are magnetic card and token operated systems so they are more sophisticated. I came across many of them in my travels to South Africa and Bali too." In addition to this, M10 mentioned that he has seen them in New Zealand and F11 mentioned that she has a prepaid meter which has electricity provided by the management in a site on the Gold Coast (Australia). The management provides an allocated 'fair usage' amount as part of the rent and if they exceed the allocated amount they are then able to purchase electricity online.

Does this graphic make clear the distinction between pre/post-paid?

Respondents were provided a graphical copy of the picktochart to review and the following feedback was received:

F2: "Yes, it is pretty clear."

F3: "Absolutely clear."

F4: "The pros and cons for each option are clear, succinct, easy to understand and informative."

F9: "Yes, the differences are stated and seem to be factual."

F11: "It is clear."

M1: "Great graphic."

M3: "Yes, it is very informative. Gives a clear idea of what is a better option and looks like prepaid is the way to go."

M6: "I am unclear about the self-disconnection risk and the 7-day emergency reserve. But the other parts I understand and I mostly understand the distinction. How the technology is different would be a further inquiry."

M7: "Seems all well explained."

M10: “The features of each option are clearly delineated.”

Summary: Most consumers found the graphic to be clearly explained and M6’s feedback was considered in the amendments of the infographic for the final survey.

Is there anything that you think should be changed in the graphic?

F4: “The red vertical line within each option looks like a comparison is made between the left-hand-side and the right-hand-side (showing competing arguments for the same option).”

F6: “I would rather show it in the landscape format with the two models one next to the other.”

F8: “Make the last page clear that it goes with Option 2 and include a heading. Maybe include arrows to the appliances? Try including air - conditioning in there, as Australians would use this appliance a lot due to lack of insulation.”

F9: “Maybe make the two options side by side if you can, landscape. The content is good.”

F10: “Make clear there is option for per appliance and overall home energy usage. Makes sense that the meter is outside and inside between the options. Also, I like that the ordering between the graphical content between the options is consistent.”

M1: “I would add how much people save in option 2.”

M4: “What needs to be shown is the saving comparison that can occur when the knowledge that you prepaid for electricity and know what you can use. Instead of post pay electricity that you do not know what you have used and by that time it can be too late and you are up for large bills. In the graphic, there needs to be physiological changes with evidence that it will save money or benefit the party who is putting it in their homes.”

M10: “The sections “Informative Meter Display Inside Home” and “Access to Online Portal” could be more clearly linked to Option 2. At the moment, it's not clear whether they apply to Option 2 or are generally available (under any option).”

Summary: This feedback was considered and included in the amendments of the infographic for the final survey.

What do you think? Would the prepaid option be something you would like to adopt? (Please describe in your own words) Why? Why not?

F1: “It would be good to be able to trial it without “risking” current arrangements.”

F2: “It might be something that we would consider in the future when we invest in our own home. Price of electricity to be competitive discounts for paying up front as we get discounts from our current company for paying bills on time. The cost of installing the meter box would have to be minimal to make it an option. Don’t like the idea of running out of electricity though and having to top up could be an annoyance. “

F3: “The new prepaid smart metering model sounds very appealing from the point of you having sole control over your own energy consumption and you know that in the time of needing more credit, it is done instantly.”

F4: “I am open to trying out the prepaid option. I tried out the prepaid option 12 years ago on my mobile phone and have not switched to a lock-in-contract.”

F6: “I would love to try it. It interests me as I don’t like receiving “blind” bills and risking to pay way more than what I would expect.”

F11: “I think it is a great idea because it helps monitor usage and avoid unnecessary debts when there is over usage and you cannot pay and/or have to cut expenditure from other areas to cater for the bill. Prepaid provides more awareness on the usage while post-paid does not.”

M5: “I don’t think it can help to reduce my electricity usage but I liked the idea of no manual reads. I am not really comfortable when somebody comes to my back yard to read the meter.”

M6: “Not really. There would have to be a clear cost advantage to going prepaid. I find the ability of the smart meter display would be novel at first but wonder how often it would actually be used.”

M10: “I would love to use the prepaid option but simply don’t have it as an option to me as the Body Corporate is in charge and I’m just a tenant. It is too hard for the individual end consumer to choose an option not readily available.”

M11: “Yes I would in combination with online credit card payment. (I wouldn't be interested in prepaid cards available in supermarkets and seven elevens.) I associate prepayment with greater control and flexibility.”

What features of prepaid smart meters would be most appealing to you?

F1: “Pay per actual usage; no estimates.”

F2: “Knowing what we are actually using and not paying for more than what we use.”

F3: “All features.”

F4: “Paying upfront, meter is accessible; the live energy feedback is innovative, alarm when credit goes off.”

F5: “I like the idea of having per appliance feedback and knowing what my carbon footprint is on the environment.”

F6: “I like the idea of being able to estimate which of my appliances consumes the most and if there is effectively a time of the day when I would spend less. I also like to be able to decide how much energy I want to buy.”

F7: “It’s accessible in home and it has informative meter display.”

F8: “Online portal access, 24/7 top up option, alarm when credit goes low.”

F10: “In home display and based on actual usage.”

F11: “Ability to calculate average daily usage, visual display of balance and usage, alert when running low, small and convenient.”

M1: “I like that we have a device in the house, which shows us how much energy we have used. I also like paying for things in advance. I feel that I have more control over my finances. Also, it seems easy to top up.”

M3: “Having a visual display to monitor usage and easy access to pay.”

M4: “Daily usage, to keep up to date of where I am. Trending data lets me know what my history for the week or day is compared to last week and to last year. If I have the knowledge I will adjust my way of using electricity. Give me an average daily amount of electricity to use so I know if I go over I need to cut back some other days.”

M5: “No manual reads.”

M6: “If the meter could tell which appliances were using excess electricity compared to normal to highlight malfunctioning or inefficient equipment so that maintenance could be undertaken to save more energy that would be appealing.”

M7: “Accurate energy readings, reduced fees, and better technology. Simplicity is key for me also, above all.”

M8: “I suppose being able to check your usage when it suits you.”

M9: “Help you to be conscious of usage and will save money.”

M11: “Smart” information on energy consumption and the lack of uncertainty regarding the size of the next bill.

Summary: The respondents seemed to recognise the benefits and features of prepayment meters (which are not always inherent in the traditional postpaid

billing system). As M2 states, “[w]e should all be given the option of prepaid at the very least!”

If you were to adopt a prepaid smart meter would you be willing to pay a premium for the additional control and features that the product gives you?

F2: “Not a premium, electricity is something that everyone needs to run a household and I would not pay a lot more to be able to monitor our usage as we already do a good job at doing this ourselves.”

F4: “Yes due to its unique features listed in the infographic.”

F5: “Yes, as long as it is not exorbitantly more expensive than other traditional post-paid plans.”

F6: “It depends on the premium.”

F8: “I would be willing to pay 10% more on the tariff for the additional features in option 2 because I know if I can see how much I use I would definitely react and sacrifice my usage.” F8 created a powerful analogy e.g. *“This is your lungs (monitor). Every time you smoke (use energy) they will get darker and darker… I would change my behaviour because I know I am harming myself.”*

F9: “Yes, because in the long term you will be saving money through the change of your habits, I think this could be up to 30%.”

F10: “I would be happier to pay a set fee for prepaid option upfront, instead of the premium being reflected in the tariff.”

M1: “Not really, but depends on what these additional controls do. If they are more cost effective in the long run. I would buy it.”

M4: “There has to be a strong correlation between the savings from post pay. As a landlord and if I was renting out to students then yes, I would make them pay a premium as it would control them and make sure that they pay the bill.”

M6: “No. With energy price increases over recent years and more expected to come I would expect that this would have to be provided at the energy retailer’s expense as a competitive advantage over their competitors. After all, being prepaid they are getting the use of my money before I get the use of the electricity.”

M7: “As long as it was simple and I could see the benefit yes.”

M10: “No, it should be part of the service provided by my energy company because after all it is a tool to reduce their administration overheads, which we already pay for via “service” charge. No meter reading, no sending bills, no chasing arrears. Surely there must be energy providers that see this as a value-added service to build and retain a customer base when compared with providers that don’t have this option.”

M11: “No. I would still use post-paid if it was the cheaper option. I would consider prepaid if it would give me a lot of control and flexibility (e.g. no lock-in contract) at a comparable (only slightly higher) price.”

Summary: There are mixed opinions whether consumers would be willing to adopt a prepaid solution at a premium. Those that desire the additional features and understand the behaviour change savings features may be willing to pay more for this option. As F8 mentioned, “I would be willing to pay 10% more on the tariff for the additional features in option 2 because I know if I can see how much I use I would definitely react and sacrifice my usage.” F8 created a powerful analogy e.g. *“This is your lungs (monitor). Every time you smoke (use energy) they will get darker and darker… I would change my behaviour because I know I am harming myself.”* Participants expressed a desire to see that they are visually harming themselves, the environment or their hip pocket for them to be driven to make change. This could be a powerful campaign used to educate consumers on the importance of energy conservation management, through direct feedback, which is enabled through the adoption of prepayment smart meters. In addition to this, M11 mentioned “I would consider prepaid if it

would give me a lot of control and flexibility (e.g. no lock-in contract) at a comparable (only slightly higher) price."

Would you adopt a prepaid smart meter from your energy supplier or third party so that you can audit the energy supplier's main meter charges?

F4: "The third party is the preferred option if I cannot audit my energy supplier."

F5: "Yes, this would make the system more transparent and make the energy suppliers accountable for over charging. Many of the energy provider's meters are old and not calibrated so I don't think they measure very accurately. Also, this would be great for my mother who lives in a Body Corporate environment so that she only pays for what she uses. As the Body Corporate takes the entire usage of the building and splits it over the lots she always subsidises for other over users when she lives on her own, this is unfair as she lives a very minimalist life and she boils two pots of kettles a day! It is also unfair for investors who have vacant units for most of the year."

F6: "I wouldn't mind getting a smart meter from the energy supplier in case it was cheaper. In case the cost was the same, I would prefer adopting it from a third party."

F9: "Another meter, so I can cross check the billing with the energy provider (I actually currently do this). This is a hybrid option; at the same time, I am aware of what I am using. It also provides a system of proof if I need to dispute something in court against the 'big guys'."

M10: "No, it should be part of the service provided by my energy company because after all it is a tool to reduce their administration overheads, which we already pay for via "service" charge. No meter reading, no sending bills, no chasing arrears. Surely there must be energy providers that see this as a value-added service to build and retain a customer base when compared with providers that don't have this option."

M11: “I'm not sure what the difference would be. In practice, I would go with the cheaper or more convenient option. I have previously used third party (intermediary) companies to get my utilities connected.”

Summary: Consumers have mixed reviews as to whether they would adopt the solution from an energy supplier or a third-party provider. The cheapest most convenient option would likely be the most ideal to market to consumers for a marketing strategy to promote adoption.

Any other comments in regards to billing of electricity:

F3: “At the moment, there is a good idea of how much energy consumption is used but should there be any signs of abnormal charges, we will be sure to investigate with the energy supplier. Should there be attitude and mistrust; the prepaid smart meter will be an alternative option. However, with the information received on the prepaid smart meter, it is a very attractive scheme and will be investigated as an alternative option to be self-sufficient.”

F5: “I find it confusing to compare different offerings between various retailers at times as I always like to bargain for a good deal.”

F8: “I hate the disconnection notices I get when I move residences in the post-paid system!”

F9: “It would be interesting to generate solar energy and sell it back to tenants (at a discount) through the prepaid system.”

F10: “If I was to stick to a post-paid option, the ideal billing cycle in post-paid billing would be monthly, as people usually do monthly budgets. Quarterly is not frequent enough.”

M2: “We should all be given the option of prepaid at the very least!”

M4: “Great idea for renters who you know can do a runner. What is stopping you from doing this for all utilities (water, electricity, gas)? Personally, I need to

see a benefit to prepay versus post pay. If there is to be a premium or it will not save me money I would stay with what I have. In the graphic, there needs to be physiological changes with evidence that it will save money or benefit the party who is putting it in their homes." M5: "Simplicity and a clear description of what the bill covers, i.e. lighting, hot water or gas etc. and so on." M7: "We are paying too much for electricity (justifications is that the infrastructure costs is high but the industry needs further competition to reduce cost) - just look at Telecom - now Telstra."

Table 2: Segments and Summaries of Focus Group Transcript

Chapter Five: Quantitative Survey Scale Purification

For all construct measures that consisted of more than one item, scale purification consisted of two steps. First, cronbach alpha reliability testing was conducted to measure the reliability of the scales. Alphas were considered acceptable if they exceeded 0.600 (Moss SC, 1998). Second, factor analyses were then conducted to confirm item loadings on some contructs; in some instances, this led to the creation of new variables if there was a logical or theoretical explanation to do so. The table below summarises the construct evolution of the scale items used in this research study and further explanations have been provided for multiple scale items.

Initial Constructs	Survey Question (Refer to Appendix E)	Alphas (Based on Standardized Items)	Separation of Factors
Environmental Concern, Beliefs, Awareness	**Q7**	**0.902**	1 factor only (4 items)
Emotional Involvement	**Q8**	**0.430**	Separated into to 4 single item factors (happiness, anger, fear and guilt)
Current Energy Curbing Behaviours	**Q9**	**0.766**	Split into 2 factors (3 items **0.763** / 2 items **0.752**)
Investment In Micro Generational Technologies and Investments	**Q10**	**0.414**	Split into 2 factors (1 item / 1 item)
Direct Feedback	**Q37**	**0.925**	1 factor (12 items)
Expectation of Others' Cooperation	**Q6 (1)**	Single Item	1 factor (1 item)
Perceived Efficacy	**Q6 (2) and (3)**	**0.592 (Cusp of 0.600)**	1 factor (2 items)
Concern About Paying Bill	**Q13**	Single Item	1 factor (1 item)
Financial Locus of Control	**Q22**	Single Item	1 factor (1 item)

Table 3: Survey Scale Purification Summary

Environmental Concern, Beliefs and Awareness

Environmental concern, beliefs and awareness of environmental problems consisted of four scale items, which were highly reliable at 0.902. A factor analysis confirmed that these four scale items loaded onto one 'environmental consciousness' factor.

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.094	77.354	77.354	3.094	77.354	77.354
2	.356	8.900	86.254			
3	.296	7.400	93.654			
4	.254	6.346	100.000			
Extraction Method: Principal Component Analysis**. KMO – 0.845**						

Table 4: Principal Component Analysis for Environmental Concsciousness

New Variable Created: EConsciousness = (Q7_1+Q7_2+Q7_3+Q7_4) / 4

Emotional Involvement

Emotional involvement consisted of four scale items, which were proven not to be reliable at 0.430. These were split into four factors for clarity of measurement of each emotion (happiness, guilt, anger and fear) in isolation. The researcher decided not to categorize negative and positive emotions because this does not accurately depict emotional involvements when compared to measuring each emotion independently. This is supported by the work of Lerner and Keltner who argue that the effects of specific emotions should be measured rather than the broad dimensions of positive and negative affect (Lerner & Keltner, 2000).

Current Energy Curbing Behaviours

Current energy curbing behaviours consisted of five scale items, which were proven to be highly reliable at 0.766. However, despite the high reliability a factor analysis indicated that these current energy-curbing behaviors should be split into two factors consisting of three items with a reliability of 0.763 and two items with a reliability of 0.752. Note that the first three measures are current energy curbing behaviours and the last two are bill-auditing energy curbing behaviours, therefore two variables have been created.

	Total Variance Explained –					
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.590	51.805	51.805	2.590	51.805	51.805
2	1.055	21.100	72.904	1.055	21.100	72.904
3	.564	11.274	84.178			
4	.405	8.093	92.271			
5	.386	7.729	100.000			
KMO – 0.725						

Table 5: Eigenvalues for Current Energy Curbing Behaviours

Rotated Component Matrix[a]		
If you were looking for ways to reduce your energy bills, please indicate how likely you would be to take the following actions?	Component	
	1	2
Turn down the thermostat a few degrees to use less electricity when the residence is empty	.831	.153
Make sure lights are off in unused rooms	.822	.209
Replace light bulbs with energy efficient light bulbs	.764	.153
Pay attention to your electricity consumption by regularly checking the meter	.150	.889
Change the time of day when you use your appliances i.e. at off-peak periods	.224	.862
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

Table 6: Principal Component Factor Analysis for Energy Curbing Behaviours

New Variable Created: EnergyCurbingBehaviours2 (Current Energy Curbing Behaviours) = (Q9_1+Q9_2+Q9_3) / 3.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.754	.763	3

Table 7: Current Energy Curbing Behaviours Cronbach Alpha

New Variable Created: EnergyCurbingBehaviours3 (Bill Auditing Energy Curbing Behaviours) = (Q9_4+Q9_5) / 2.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.751	.752	2

Table 8: Bill Auditing Energy Curbing Behaviours Cronbach Alpha

Investment in Micro generational Technologies and Investments

Investment in micro generational technologies and investments consisted of two scale items, which were proven to not be reliable at 0.414. The two items were split into two factors as one is measuring investment in solar panels and one is measuring the replacement of existing appliances with energy efficient appliances before the old appliances are worn out.

Direct Feedback

Direct feedback consists of 12 scale items, which were proven to be highly reliable at 0.925. A factor analysis indicated that these 12 scale items load into two factors. However, the researcher has chosen to keep direct feedback as one factor as there is no logical explanation for the split of the features.

Rotated Component Matrix[a]		
How important would the following features be to you?	Component	
	1	2
Monitor that shows consumption and credit in dollars and KWHs	.885	.112
Monitor that shows how much energy the household is drawing at a particular time	.855	.237
A monitor with an interactive visual display placed within a visible location inside the home	.837	.180
Ability to measure energy consumption per appliance	.822	.243
24/7 access to online meter account to view consumption habits in a graph format	.812	.323
24/7 access to online meter account to access receipts and make payments	.778	.211
Ability to receive reminder SMS and e-mail alerts to top up my energy when my credit is low	.564	.366
Access to comparative data to see how much the household is using in comparison to neighbours in the building or are	.521	.481
Ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week)	.148	.895
The option to integrate electricity usage with popular social Internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends)	.070	.888
Ability to download an application on my mobile device to measure my personal electricity consumption in real time	.420	.700
Ability to determine the household's carbon footprint impact on the environment	.469	.597
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.	**KMO – 0.891**	

Table 9: Principal Component Factor Analyis for Direct Feedback

New Variable Created: DirectFeedback = (Q37_1 + Q37_2 + Q37_3 + Q37_4 + Q37_5 + Q37_6 + Q37_7 + Q37_8 + Q37_9 + Q37_10 + Q37_11 + Q37_12) / 12)

Perceived Efficacy

Perceived efficacy consisted of two scale items, which were proven to be on the cusp of reliability at 0.592. However, a factor analysis indicated that these items loaded onto one factor. This is as expected because the scale items were adopted from the literature (Ellen, Wiener, & Cobb-Walgren, 1991).

	Total Variance Explained					
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.420	71.022	71.022	1.420	71.022	71.022
2	.580	28.978	100.000			
Extraction Method: Principal Component Analysis.						

Table 10: Eigen Values for Perceived Efficacy

New Variable Created: PerceivedEfficacy= (Q6_2+Q6_3) / 2

Chapter Six: Quantitative Results

The quantitative data analysis consists of descriptive statistics, bivariate regressions, ANOVAS, t-tests and multivariate analysis. This section will present the statistical results per dimension (consumer psychology, financial, product and demographic) and per factor under each dimension. The researcher starts with consumer psychological factors.

CONSUMER PSYCHOLOGY FACTORS

In total there are 15 constructs that fall under consumer psychology factors. The first construct to be examined is environmental consciousness.

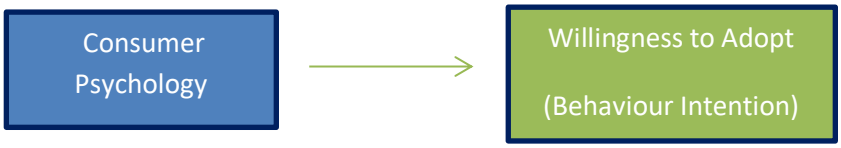

Figure 10: Consumer Psychology Factors' Impact on Willingness to Adopt the PPMSS

Below is a table of the descriptive statistics for all of the consumer psychology factors tested:

Factors	N	Range	Mean	Standard Deviation	Variance Statistic
Environmental Consciousness	210	6	5.18	1.179	1.391
Happy	210	4	1.96	0.784	0.615
Guilty	210	4	2.69	1.004	1.009
Angry	210	4	2.82	1.050	1.103
Fearful	210	4	2.95	1.048	1.098
Current Energy Curbing Behaviours	210	4.33	5.675	.6804	.463
Bill Auditing Energy Curbing Behaviours	210	5	4.464	1.3430	1.804
Investment in Solar Panels	210	3	2.35	1.062	1.129
Investment in Energy Efficient Home Appliances	210	3	2.20	0.987	0.974
Reaction to Receipt of Post Paid Bill	210	3	1.44	0.633	0.401

Frequency of Meter Reads	210	4	2.01	1.143	1.306
Direct Feedback	210	6	4.552	1.2186	1.485
Eagerness to Try New Technologies	210	5	2.89	1.068	1.141
Expectation of Others' Cooperation	210	4	3.48	0.903	0.815
Perceived Efficacy	210	4	2.48	0.890	0.791

Table 11: Descriptive Statistics for Consumer Psychology Factors Tested

Environmental Consciousness (Composite measure consisting of four items)

The composite environmental consciousness factor (which incorporates environmental concern, environmental beliefs and awareness of environmental problems scales) was measured against willingness to adopt the PPMSS. It is hypothesized that the more environmentally conscious the respondent is the more willing they will be to adopt the PPMSS. The properties of the four underlying measures follow.

Environmental Concern: Environmental concern signifies the individual's general consciousness toward the environment. Consumers with a stronger concern for the environment are more likely to purchase products that are environmentally friendly than those who are less concerned about environmental issues (Yeonshin & Sejung, 2005). Respondents were asked the following question in the survey to measure environmental concern:

To what extent do you agree or disagree with the following statements (strongly disagree to strongly agree):

- **I am extremely worried about the state of the environment**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	5	2.4	2.4	2.4
	Disagree	16	7.6	7.6	10.0
	Somewhat Disagree	21	10.0	10.0	20.0
	Neither Agree nor Disagree	32	15.2	15.2	35.2
	Somewhat Agree	73	34.8	34.8	70.0
	Agree	39	18.6	18.6	88.6
	Strongly Agree	24	11.4	11.4	100.0
	Total	210	100.0	100.0	

Table 12: Frequency of Environmental Concern Responses

Environmental Beliefs: This indicates the consumer's environmental beliefs (attitudes) by adopting measures from (Gadenne et al., 2011). Some studies have shown that those with stronger pro-environmental beliefs were more likely to engage in environmental oriented purchasing behaviour as beliefs shape our values and values precede pro-environmental behavioural action (Gadenne et al., 2011). Respondents were asked the following questions in the survey to measure environmental beliefs.

To what extent do you agree or disagree with the following statements (strongly disagree to strongly agree):

- **When humans interfere with nature it often has disastrous consequences**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	5	2.4	2.4	2.4
	Disagree	5	2.4	2.4	4.8
	Somewhat Disagree	7	3.3	3.3	8.1
	Neither Agree nor Disagree	25	11.9	11.9	20.0
	Somewhat Agree	76	36.2	36.2	56.2
	Agree	51	24.3	24.3	80.5
	Strongly Agree	41	19.5	19.5	100.0
	Total	210	100.0	100.0	

Table 13: Frequency of Environmental Belief Responses ½

- **The balance of nature is very delicate and easily upset**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	2	1.0	1.0	1.0
	Disagree	3	1.4	1.4	2.4
	Somewhat Disagree	7	3.3	3.3	5.7
	Neither Agree nor Disagree	27	12.9	12.9	18.6
	Somewhat Agree	76	36.2	36.2	54.8
	Agree	55	26.2	26.2	81.0
	Strongly Agree	40	19.0	19.0	100.0
	Total	210	100.0	100.0	

Table 14: Frequency of Environmental Belief Responses 2/2

Awareness (Knowledge) of Environmental Problems: Environmental effects are not immediately tangible and this is often a cognitive barrier to environmental awareness. “Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. We are in many respects like the frog in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react until they boiled to death (Kollmuss & Agyeman, 2002).” This construct will adopt (Sütterlin et al., 2011)’s measure of awareness of environmental problems. Awareness of environmental problems does not necessarily mean that this will translate into intended action to purchase the PPMSS. Respondents were asked the following question in the survey to measure awareness (knowledge of environmental problems):

To what extent do you agree or disagree with the following statements (strongly disagree to strongly agree):

-The increasing energy demand is a serious problem for our society

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	3	1.4	1.4	1.4
	Disagree	6	2.9	2.9	4.3
	Somewhat Disagree	11	5.2	5.2	9.5
	Neither Agree nor Disagree	21	10.0	10.0	19.5
	Somewhat Agree	68	32.4	32.4	51.9
	Agree	57	27.1	27.1	79.0
	Strongly Agree	44	21.0	21.0	100.0

	Total	210	100.0	100.0	

Table 15: Frequency of Awareness of Environmental Problems Responses

Hypothesis: The more conscious the consumer is of the environment the more likely they will be to adopt the PPMSS.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.929	.407		4.739	.000
	Environmental Consciousness	.154	.077	.138	2.016	.045

Table 16: Regression for Environmental Consciousness

Result: The bivariate results indicated that there is a significant positive relationship ($p = 0.045$, $t = 2.016$, $\beta = 0.138$, $r = 0.118$ (small effect size (Cohen, 1988)) between environmental consciousness and willingness to adopt the PPMSS. Therefore, consumers who are more concerned about the environment, tend to have more pro-environmental beliefs and also are aware of environmental issues will be more 'environmentaly conscious' and ultimately more willing to engage in pro-environmental behaviour.

Emotional Involvement: Emotional involvement was split into four factors (happiness, guilt, fear and anger) and each of these emotions in isolation was measured against willingness to adopt the PPMSS. Emotional involvement is defined as the extent to which one has had an affective relationship in the natural world (Kollmuss & Agyeman, 2002). According to Chawla's work (Chawla, 1998) (Chawla, 1999) emotional connection is vital in moulding our values, attitudes and beliefs towards the environment (Kollmuss & Agyeman, 2002). In addition to this, emotional involvement is the ability to have an emotional reaction to environmental degradation. Previous research has shown that women are more prone to react emotionally to environmental issues (Lehmann, 1999). Therefore, the stronger a person's emotional reaction, the more likely the person will engage in pro-environmental behaviour (Grob, 1991). The emotional reaction is stronger when one experiences the degradation directly (Chawla, 1999). Fear, sadness, pain and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002, p. 255). A strong emotional investment and

perceived efficacy will instigate action (Kollmuss & Agyeman, 2002, p. 255). Action in this case is the intention to adopt the PPMSS.

Happiness

When you think of the way humans are altering the environment how do you feel?

-Happy (not at all to extremely)

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at All	58	27.6	27.6	27.6
	Not	112	53.3	53.3	81.0
	Somewhat	33	15.7	15.7	96.7
	Very	5	2.4	2.4	99.0
	Extremely	2	1.0	1.0	100.0
	Total	210	100.0	100.0	

Table 17: Frequency of Emotional Involvement (Happiness) Responses

Hypothesis: The less happy the consumer feels about the way humans are altering the environment the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	3.314	.241		13.743	.000
	When you think of the way humans are altering the environment how do you feel? – Happy	-.299	.114	-.178	-2.613	.010

Table 18: Regression for Emotional Involvement (Happiness)

Guilt

When you think of the way humans are altering the environment how do you feel?

-Guilty (not at all to extremely)

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at All	30	14.3	14.3	14.3
	Not	47	22.4	22.4	36.7
	Somewhat	102	48.6	48.6	85.2
	Very	20	9.5	9.5	94.8
	Extremely	11	5.2	5.2	100.0
	Total	210	100.0	100.0	

Table 19: Frequency of Emotional Involvement (Guilt) Responses

Hypothesis: The guiltier the consumer feels of the way humans are altering the environment the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.856	.253		7.351	.000
	When you think of the way humans are altering the environment how do you feel? – Guilty	.324	.088	.248	3.685	.000

Table 20: Regression for Emotional Involvement (Guilt)

Fear

When you think of the way humans are altering the environment how do you feel?

-Fearful (not at all to extremely)

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at All	20	9.5	9.5	9.5
	Not	41	19.5	19.5	29.0
	Somewhat	97	46.2	46.2	75.2
	Very	33	15.7	15.7	91.0
	Extremely	19	9.0	9.0	100.0
	Total	210	100.0	100.0	

Table 21: Frequency of Emotional Involvement (Fear) Responses

Hypothesis: The more fearful the consumer feels of the way humans are altering the environment the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.223	.270		8.234	.000
	When you think of the way humans are altering the environment how do you feel? – Fearful	.171	.086	.136	1.985	.048

Table 22: Regression for Emotional Involvement (Fear)

Anger

When you think of the way humans are altering the environment how do you feel?

-Angry (not at all to extremely)

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at All	24	11.4	11.4	11.4
	Not	48	22.9	22.9	34.3
	Somewhat	96	45.7	45.7	80.0
	Very	25	11.9	11.9	91.9
	Extremely	17	8.1	8.1	100.0
	Total	210	100.0	100.0	

Table 23: Frequency of Emotional Involvement (Anger) Responses

Hypothesis: The angrier the consumer feels at the way humans are altering the environment the more willing they will be to adopt the PPMSS.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.141	.258		8.301	.000
	When you think of the way humans are altering the environment how do you feel? –Angry	.208	.086	.166	2.430	.016

Table 24: Regression for Emotional Involvement (Anger)

Results: The bivariate results indicated that there was a significant relationship when respondents are emotionally involved in the way that humans are altering the environment and this has a significant relationship on their willingness to adopt the PPMSS. The feelings of anger ($p = 0.016$, $t = 2.430$, $\beta = 0.166$, $r = 0.152$(small effect size)), fear ($p = 0.048$, $t = 1.985$, $\beta = 0.136$, $r = 0.118$ (small effect size)) and guilt ($p = 0.001$, $t = 3.685$, $\beta = 0.248$, $r = 0.239$ (small to medium effect size)) had a positive significant relationship and the feeling of happiness

had a negative significant relationship (p = 0.010, t = - 2.613, β = -0.178, r =0.164 (small effect size)). These results were all significant in the expected direction however the results do not substantiate the literature which has shown that fear, sadness and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). In contrast this study shows that the feeling of guilt is the most likely to explain more variance for pro-environmental behaviour over the other emotions. In addition to this, these results indicate that negative feelings have a positive effect on proenvironmental behaviours and that happy feelings have the reverse effect.

Current Energy Curbing Behaviours: This construct was split into two measures (current energy curbing behaviours and bill auditing energy curbing behaviours) and they test whether the respondent currently engages in energy curbing behaviours at their household. Those who currently engage in energy curbing behaviours at their household are anticipated to be more likely to adopt the PPMSS.

Current Energy Curbing Behaviours (composite measure consisting of 3 items):

If you were looking for ways to reduce your energy bills, please indicate how likely you would be to (very unlikely to likely):

- **Make sure lights are off in unused rooms**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Unlikely	1	.5	.5	.5
	Unlikely	2	1.0	1.0	1.4
	Somewhat Unlikely	3	1.4	1.4	2.9
	Undecided	1	.5	.5	3.3
	Somewhat Likely	26	12.4	12.4	15.7

	Likely	177	84.3	84.3	100.0
	Total	210	100.0	100.0	

Table 25: Frequency of Current Energy Curbing Behaviours Responses 1/3

- **Turn down the thermostat a few degrees to use less electricity when the residence is empty**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Unlikely	4	1.9	1.9	1.9
	Unlikely	1	.5	.5	2.4
	Somewhat Unlikely	4	1.9	1.9	4.3
	Undecided	9	4.3	4.3	8.6
	Somewhat Likely	32	15.2	15.2	23.8
	Likely	160	76.2	76.2	100.0
	Total	210	100.0	100.0	

Table 26: Frequency of Current Energy Curbing Behaviours Responses 2/3

- **Replace light bulbs with energy efficient light bulbs**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Unlikely	2	1.0	1.0	1.0
	Unlikely	3	1.4	1.4	2.4
	Somewhat Unlikely	2	1.0	1.0	3.3
	Undecided	6	2.9	2.9	6.2
	Somewhat Likely	29	13.8	13.8	20.0
	Likely	168	80.0	80.0	100.0
	Total	210	100.0	100.0	

Table 27: Frequency of Current Energy Curbing Behaviours Responses 3/3

Hypothesis: The more likely the consumer is to engage in energy curbing behaviours then the more likely they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.663	.766		3.477	.001
	Current Energy Curbing Behaviours	.012	.134	.006	.086	.931

Table 28: Regression for Current Energy Curbing Behaviours

Result: The bivariate results indicated that although consumers may engage in current energy curbing behaviours this does not have a significant impact ($p = 0.931$, $t = 0.086$, $\beta = 0.006$, $r = 0.071$) on their willingness to adopt the PPMSS.

Bill Auditing Energy Curbing Behaviours (composite measure consisting of 2 items):

If you were looking for ways to reduce your energy bills, please indicate how likely you would be to (very unlikely to likely):

- **Change the time of day when you use your appliances i.e. at off-peak periods**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Unlikely	11	5.2	5.2	5.2
	Unlikely	11	5.2	5.2	10.5
	Somewhat Unlikely	23	11.0	11.0	21.4
	Undecided	43	20.5	20.5	41.9
	Somewhat Likely	51	24.3	24.3	66.2
	Likely	71	33.8	33.8	100.0

	Total	210	100.0	100.0	

Table 29: Frequency of Bill Auditing Energy Curbing Behaviours Responses 1/2

- **Pay attention to your electricity consumption by regularly checking the meter**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Unlikely	13	6.2	6.2	6.2
	Unlikely	16	7.6	7.6	13.8
	Somewhat Unlikely	31	14.8	14.8	28.6
	Undecided	38	18.1	18.1	46.7
	Somewhat Likely	42	20.0	20.0	66.7
	Likely	70	33.3	33.3	100.0
	Total	210	100.0	100.0	

Table 30: Frequency of Bill Auditing Energy Curbing Behaviours Responses 2/2

53.30% of the sample reported that they would be somewhat likely and likely to pay attention to their electricity consumption by regularly checking the meter.

Hypothesis: The more likely the consumer is to engage in bill auditing energy curbing behaviour then the more likely they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.226	.314		7.079	.000
	Bill Auditing Energy Curbing Behaviours	.113	.067	.115	1.670	.096

Table 31: Regression for Bill Auditing Energy Curbing Behaviours

Result: The bivariate results indicated that although consumers may engage in current bill auditing energy curbing behaviours this does not have a significant impact ($p = 0.096$, $t = 1.670$, $\beta = 0.115$, $r = 0.089$) on their willingness to adopt the PPMSS. Even though bill auditing energy curbing behaviours are more closely related to the PPMSS product, they are still not product specific behaviours and as such, in accordance with Fietkau and Kessel (1981)'s model, if attitudes are not product specific then they may not have an impact on proenvironmental behaviour (Kollmuss & Agyeman, 2002).

Energy Related Home Improvements and Investments in Micro-Generation Technologies: "90% of Australians have, or would consider including, solar in their home energy mix (Ernst & Young, 2014, p. 2)." Therefore, this construct will test whether the respondent has invested in micro-generation technologies and other energy related home improvements. This construct was split into two factors (investment in solar panels and investment in energy efficient home improvements).

Investment in Solar Panels

Which of the following applies to you in regards to your energy related expenditures?

- **Install solar panels**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Currently Have Installed	54	25.7	25.7	25.7
	Have Considered	68	32.4	32.4	58.1
	Have Not Considered But Will Do So In the Future	48	22.9	22.9	81.0
	Would Never Consider	40	19.0	19.0	100.0
	Total	210	100.0	100.0	

Table 32: Frequency of Installation of Solar Panels Responses

58.10% of the sample have, or would consider including solar in their home energy mix, this is in contrast to the 90.00% of Australian in the Ernst and Young study mix (Ernst & Young, 2014) as the researcher has only sampled household decision makers in three states. F5 from the focus group mentioned, "I used to get shocked by the rising prices but I mitigated that by installing solar panels at my residence before the feed in tariff rules were changed."

Hypothesis: The more likely consumers are to invest in solar panels then the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.897	.221		13.104	.000
	Install solar panels	-.072	.086	-.058	-.837	.404

Table 33: Regression for Installation of Solar Panels

Result: The bivariate results indicated that an investment in solar panels does not have a significant impact ($p = 0.404$, $t = -0.837$, $\beta = -0.058$, $r = 0.032$) on the consumers' willingness to adopt the PPMSS. This could be because those who install solar panels may not necessarily want to adjust or sacrifice their lifestyle by using less energy. For example, M8 from the qualitative research explained that when the energy bill comes in "[w]e probably only look at what we owe and check what our solar contributions have been for that period. We do not adjust our usage."

However, the results may differ if you were to target investors and include the PPMSS as part of a 'solar PPMSS' package. As F9 noted "[i]t would be interesting to generate solar energy and sell it back to tenants (at a discount) through the prepaid system."Currently, solar companies have not been able to unlock and target the 'investor' market for solar. Primary occupiers who choose to rent or sell their homes cannot take their solar systems and feed-in tariffs with them. Should they choose to rent out their property, investors currently do not have an incentive to install solar panels on the rooftops of their investment properties as there is a considerable payback period and they cannot bill their tenants and recoup the energy usage. However, if they were to install a private sub-meter (this could be post or prepaid) this enables the landlord to keep the energy bill in their name and still receive the feed in tariff, whilst still providing tenants discounted energy to the going market rates being charged by the energy retailer. This solution

means that the landlord will have an account with the energy provider and recoup money from their tenants for energy and will be able to generate an extra return. Investors are also able to depreciate their investment with before tax income unlike owner-occupiers who are unable to deduct this investment and can only pay back the investment with after tax income.

Investment in Energy Efficient Home Improvements

Which of the following applies to you in regards to your energy related expenditures?

- **Replace existing appliances with energy efficient appliances before the old appliances are worn out**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Currently Have Installed	59	28.1	28.1	28.1
	Have Considered	76	36.2	36.2	64.3
	Have Not Considered But Will Do So In Future	49	23.3	23.3	87.6
	Would Never Consider	26	12.4	12.4	100.0
	Total	210	100.0	100.0	

Table 34: Frequency of Investment in Energy Efficient Home Improvements Responses

Hypothesis: The more likely consumers are to replace their energy efficient appliance before they break then the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.962	.222		13.343	.000
	Replace existing appliances with energy efficient appliances before the old appliances are worn out	-.106	.092	-.080	-1.152	.251

Table 35: Regression for Replacing Existing Appliances with Energy Efficient Appliances Before the Old Appliances are Worn Out

Result: The bivariate results indicated that the replacement of energy efficient appliance before they break does not have a significant impact ($p = 0.251$, $t = -1.152$, $\beta = -0.080$, $r = 0.045$) on the consumers' willingness to adopt the PPMSS. This finding is consistent with Fietkau and Kessel (1981)'s model which emphasized that one has to measure attitudes towards the product of interest to gauge its affect on behaviours (intentions, purchases) towards the product. (Kollmuss & Agyeman, 2002). So, measuring attitudes towards another energy product (energy efficient appliances before they break in this case) does not influence the intended adoption of the PPMSS.

Feedback / Knowledge: Consumers have to receive positive reinforcement (feedback) to continue to act in environmentally friendly manner (Fietkau & Kessel, 1981). This study measures both direct and indirect feedback.

Indirect Feedback:

This construct will assess what knowledge (historical/indirect feedback) consumers are currently receiving in a post-paid billing environment by analysing the consumer's historical bill and frequency of meter reads by consumers (Oseni et al., 2013).

Which of the following best describes your typical reaction upon receiving your energy bill from the energy provider?

		Frequency	Percent	Valid Percent	Cumulative Percent
	I read it carefully every billing period	130	61.9	61.9	61.9
	I read it quickly every billing period	70	33.3	33.3	95.2
	I read it infrequently	7	3.3	3.3	98.6
	I never read it	3	1.4	1.4	100.0
	Total	210	100.0	100.0	

Table 36: Frequency of Indirect Feedback (Reaction Upon Receiving Energy Bill) Responses

61.90% of the respondents mention that they read their bill carefully every billing period and 33.30% of respondents mentioned that they read it quickly every billing period.

In the last year, how often did you check the meter reading of the meter supplied by your energy provider?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Never	103	49.0	49.0	49.0
	Once a Year	29	13.8	13.8	62.9
	Every 3 months	54	25.7	25.7	88.6
	Monthly	20	9.5	9.5	98.1
	Weekly	4	1.9	1.9	100.0
	Total	210	100.0	100.0	

Table 37: Frequency of Indirect Feedback (Checking Meter Reading) Responses

49.00% of respondents surveyed never check the meter reading of the meter supplied by the energy provider, 25.70% check once every 3 months, 13.80% check once a year, 9.50% check monthly and 1.90% checks weekly. This shows that many consumers in the traditional post-paid system do not check their meter reading often, possibly because they are often located outside the home or locked away and have crude displays. As F5 mentioned in the focus group “I never check it I know that it is outside my home and it is like a ‘boy’s toy’. I am pretty sure my husband checks it once in a while.”

In addition to this, M4 explained that he never checks the meter that “is locked behind a door that landlords and meter readers only have the key for.” Therefore, this indicates that those who live in multi-residential Body Corporate environments are often the least likely or able to check their meter readings. Also, in older buildings it is common for many of them to not be individually metered per lot, as such many residents, particularly in Queensland, are being billed based on estimated meter readings rather than actual meter readings.

Hypothesis: The more frequently the consumer checks the meter reading the more likely they will be to adopt the PPMSS.

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	15.469[a]	4	3.867	2.291	.061	.043
Intercept	426.147	1	426.147	252.443	.000	.552
Q17 – Frequency of Meter Reads	15.469	4	3.867	2.291	.061	.043
Error	346.059	205	1.688			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .043 (Adjusted R Squared = .024)						

Table 38: ANOVA for Frequency of Meter Reads

Result: There was a marginal significant effect of indirect feedback, i.e., the frequency the energy consumer checks the meter reading on willingness to adopt the PPMSS at the p <0.050 [F (4, 205) = 2.291, p = 0.061].

Direct Feedback (composite measure consisting of 12 items): "The literature indicates significant demand reduction in the short to medium term and a continued ability to develop energy literacy in the longer term from feedback. The latter is the most important 'transformational' characteristic of feedback (Darby, 2008, p. 506)" on energy use to electricity consumers. Direct feedback allows for effective action to conserve through self-regulated learning, this interactivity allows consumers to change their behaviour habits into the future. "People learn more deeply through interaction, as it is partly during this practice, and the reflection that comes during and after it, that experiences and messages are filtered and synthesised into meaningful knowledge" (Simcock et al., 2014, p. 463). Direct feedback is omnipresent through the use of the PPMSS and comes in the form of an interactive in-home display with live energy consumption data and access to an online portal (McKerracher & Torriti, 2012). In addition, this per appliance feedback is an important form of direct feedback because energy consumers know little about energy use related to their behaviour (Wood & Newborough, 2003). For example, when assessing the energy use of appliances,

they think that energy use is related to the size of the appliance. The larger the appliance, the more energy is believed to be used (Steg, 2008).

Another interesting aspect of direct feedback could be in the form of social norm data where users can compare their usage to neighbours in the building or neighbourhood's (Petkov et al., 2011). Furthermore, direct feedback can also come in the form of social media competitions and sharing (Froehlich, 2009) and live energy tips (Allcott, 2011) to motivate consumers to use less energy. If consumer's desire features of direct feedback, then they will be more likely to adopt the PPMSS.

Despite direct feedback being a composite measure, each of the features will first be examined in isolation so that there is an insight into which specific features the respondents preferred for product development and marketing purposes.

How important would the following features be to you if you had a monitor in your home that allows you to monitor measure and manage your electricity usage in a prepaid manner?

- **A monitor with an interactive visual display placed within a visible location inside the home**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	12	5.7	5.7	5.7
	Very Unimportant	5	2.4	2.4	8.1
	Somewhat Unimportant	9	4.3	4.3	12.4
	Neither Important nor Unimportant	28	13.3	13.3	25.7
	Somewhat Important	70	33.3	33.3	59.0
	Very Important	47	22.4	22.4	81.4
	Extremely Important	39	18.6	18.6	100.0
	Total	210	100.0	100.0	

Table 39: Frequency of Direct Feedback Responses (1/12)

The majority of respondents surveyed think that a monitor with an interactive visual display placed within a visual location in the home is somewhat important (33.30%), very important (22.40%) and extremely important (39.00%).

- **Monitor that shows consumption and credit in dollars and KWHs**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	9	4.3	4.3	4.3
	Somewhat Unimportant	8	3.8	3.8	8.1
	Neither Important nor Unimportant	10	4.8	4.8	12.9
	Somewhat Important	63	30.0	30.0	42.9
	Very Important	65	31.0	31.0	73.8
	Extremely Important	55	26.2	26.2	100.0
	Total	210	100.0	100.0	

Table 40: Frequency of Direct Feedback Responses (2/12)

The majority of respondents surveyed think that a monitor that shows consumption and credit in dollars and KWHS is somewhat important (30.00%), very important (31.00%) and extremely important (26.20%).

- **Monitor that shows how much energy the household is drawing at a particular time**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	10	4.8	4.8	4.8
	Very Unimportant	3	1.4	1.4	6.2
	Somewhat Unimportant	6	2.9	2.9	9.0
	Neither Important nor Unimportant	17	8.1	8.1	17.1
	Somewhat Important	63	30.0	30.0	47.1
	Very Important	64	30.5	30.5	77.6
	Extremely Important	47	22.4	22.4	100.0
	Total	210	100.0	100.0	

Table 41: Frequency of Direct Feedback Responses (3/12)

The majority of respondents surveyed think that a monitor that shows how much energy the household is drawing at a particular time is somewhat important (30.00%), very important (30.50%) and extremely important (22.40%).

- **24/7 access to online meter account to access receipts and make payments**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	12	5.7	5.7	5.7
	Very Unimportant	1	.5	.5	6.2
	Somewhat Unimportant	9	4.3	4.3	10.5
	Neither Important nor Unimportant	28	13.3	13.3	23.8
	Somewhat Important	52	24.8	24.8	48.6
	Very Important	59	28.1	28.1	76.7
	Extremely Important	49	23.3	23.3	100.0
	Total	210	100.0	100.0	

Table 42: Frequency of Direct Feedback Responses (4/12)

The majority of respondents surveyed think that 24/7 access to an online meter account to access receipts and make payments is somewhat important (24.80%), very important (28.10%) and extremely important (23.30%).

- **24/7 access to online meter account to view consumption habits in a graph format**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	13	6.2	6.2	6.2
	Very Unimportant	3	1.4	1.4	7.6
	Somewhat Unimportant	12	5.7	5.7	13.3
	Neither Important nor Unimportant	29	13.8	13.8	27.1
	Somewhat Important	61	29.0	29.0	56.2
	Very Important	56	26.7	26.7	82.9
	Extremely Important	36	17.1	17.1	100.0
	Total	210	100.0	100.0	

Table 43: Frequency of Direct Feedback Responses (5/12)

The majority of respondents surveyed think that 24/7 access to an online meter account to view consumption habits in a graph format is somewhat important (29.00%), very important (26.70%) and extremely important (17.10%).

- **Access to comparative data to see how much the household is using in comparison to neighbours in the building or area**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	25	11.9	11.9	11.9
	Very Unimportant	11	5.2	5.2	17.1
	Somewhat Unimportant	22	10.5	10.5	27.6
	Neither Important nor Unimportant	47	22.4	22.4	50.0
	Somewhat Important	49	23.3	23.3	73.3
	Very Important	40	19.0	19.0	92.4
	Extremely Important	16	7.6	7.6	100.0
	Total	210	100.0	100.0	

Table 44: Frequency of Direct Feedback Responses (6/12)

22.40% of the respondents showed that access to comparative data to see how much the household is using in comparison to neighbours in the building or area was neither important nor unimportant, 23.30% believed it was somewhat important and 19.00% believed it was very important.

- **Ability to measure energy consumption per appliance**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	10	4.8	4.8	4.8
	Very Unimportant	5	2.4	2.4	7.1
	Somewhat Unimportant	7	3.3	3.3	10.5
	Neither Important nor Unimportant	26	12.4	12.4	22.9
	Somewhat Important	62	29.5	29.5	52.4
	Very Important	54	25.7	25.7	78.1
	Extremely Important	46	21.9	21.9	100.0
	Total	210	100.0	100.0	

Table 45: Frequency of Direct Feedback Responses (7/12)

29.50% of the respondents indicated that the ability to measure energy consumption per appliance was somewhat important, 25.70% believed it was very important and 21.90% believed it was extremely important.

- **Ability to determine the household's carbon footprint impact on the environment**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	26	12.4	12.4	12.4
	Very Unimportant	8	3.8	3.8	16.2
	Somewhat Unimportant	15	7.1	7.1	23.3

	Neither Important nor Unimportant	62	29.5	29.5	52.9
	Somewhat Important	46	21.9	21.9	74.8
	Very Important	31	14.8	14.8	89.5
	Extremely Important	22	10.5	10.5	100.0
	Total	210	100.0	100.0	

Table 46: Frequency of Direct Feedback Responses (8/12)

29.50% of the respondents indicated that the ability to determine the household's carbon footprint impact on the environment was neither important nor unimportant, 21.90% believed it was somewhat important, 14.80% believed it was very important and 10.50% believed it was extremely important.

- **Ability to download an application on my mobile device to measure my personal electricity consumption in real time**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	43	20.5	20.5	20.5
	Very Unimportant	16	7.6	7.6	28.1
	Somewhat Unimportant	20	9.5	9.5	37.6
	Neither Important nor Unimportant	38	18.1	18.1	55.7
	Somewhat Important	43	20.5	20.5	76.2
	Very Important	32	15.2	15.2	91.4
	Extremely Important	18	8.6	8.6	100.0
	Total	210	100.0	100.0	

Table 47: Frequency of Direct Feedback Responses (9/12)

18.10% of the respondents indicated that the ability to download an application on a mobile device to measure personal electricity consumption in real time is neither important nor unimportant, 20.50% believed it was somewhat important, 15.20% believed it was very important and 8.60% believed it was extremely important.

- **Ability to receive reminder SMS and e-mail alerts to top up my energy when my credit is low**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	22	10.5	10.5	10.5
	Very Unimportant	5	2.4	2.4	12.9
	Somewhat Unimportant	11	5.2	5.2	18.1
	Neither Important nor Unimportant	25	11.9	11.9	30.0
	Somewhat Important	53	25.2	25.2	55.2
	Very Important	45	21.4	21.4	76.7
	Extremely Important	49	23.3	23.3	100.0
	Total	210	100.0	100.0	

Table 48: Frequency of Direct Feedback Responses (10/12)

11.90% respondents indicated that the ability to receive reminder SMS and e-mail alerts to top up energy when credit is low is neither important nor unimportant, 25.20% believed it was somewhat important, 21.40% believed it was very important and 23.30% believed it was extremely important.

- **The option to integrate electricity usage with popular social Internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends)**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	79	37.6	37.6	37.6
	Very Unimportant	31	14.8	14.8	52.4
	Somewhat Unimportant	32	15.2	15.2	67.6
	Neither Important nor Unimportant	34	16.2	16.2	83.8
	Somewhat Important	15	7.1	7.1	91.0
	Very Important	13	6.2	6.2	97.1
	Extremely Important	6	2.9	2.9	100.0
	Total	210	100.0	100.0	

Table 49: Frequency of Direct Feedback Responses (11/12)

37.60% respondents indicated that the option to integrate electricity usage with popular social internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends was not at all important, 14.80% believed it was very unimportant, 15.20% believed it was somewhat unimportant and 16.20% believed it was neither important nor unimportant. Therefore, it is clear that this feature is not as important as the previous features examined.

- **Ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week)**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not at all Important	75	35.7	35.7	35.7
	Very Unimportant	23	11.0	11.0	46.7
	Somewhat Unimportant	32	15.2	15.2	61.9
	Neither Important nor Unimportant	39	18.6	18.6	80.5
	Somewhat Important	25	11.9	11.9	92.4
	Very Important	7	3.3	3.3	95.7
	Extremely Important	9	4.3	4.3	100.0
	Total	210	100.0	100.0	

Table 50: Frequency of Direct Feedback Responses (12/12)

35.70% respondents indicated that the ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week) was not at all important, 11.00% believed it was very unimportant, 15.20% believed it was somewhat unimportant and 18.60% believed it was neither important nor unimportant. Therefore, just like the last social normative feature of direct feedback, respondents found the prior examined features more important.

In summary, the most favoured features for product developers to consider are:

- A monitor with an interactive visual display placed within a visual location in the home
- A monitor that shows consumption and credit in dollars
- A monitor that shows how much energy the household is drawing at a particular time
- 24/7 access to an online meter account to access receipts and make payments
- 24/7 access to an online meter account to view consumption habits in a graph format
- Access to comparative data to see how much the household is using in comparison to neighbours in the building or area

- The ability to measure energy consumption per appliance
- The ability to determine the household's carbon footprint impact on the environment
- The ability to download an application on a mobile device to measure personal electricity consumption in real time
- The ability to receive reminder SMS and e-mail alerts to top up energy when credit is low

The least favoured features for product developers to be informed of are the following features (despite games and social media becoming emerging arenas):

- The option to integrate electricity usage with popular social internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends
- The ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week).

Hypothesis: The more the consumer's desirability of direct feedback (through the features of the PPMSS) then the higher the willingness to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	.523	.315		1.660	.098
	Direct Feedback	.485	.067	.449	7.246	.000

Table 51: Regression for Direct Feedback

Result: The bivariate results indicated that the desirability of direct feedback through certain features inherent in the PPMS has a significant impact ($p = 0.001$, $t = 7.246$, $\beta = 0.485$, $r = 0.445$ (medium to large effect size)) on their willingness to adopt the PPMSS. This is as expected because these features are directly attributed to the product (the PPMSS) and are often not available in the existing

traditional post-paid scenario. If consumers desire to utilise and have access to these novel features, then this will instigate adoption. This is consistent with Fietkau and Kessel (1981)'s model which emphasized that attitudes need to be product specific in order to have any impact on pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Eagerness to Try New Technologies: The adoption of technology depends on varying levels of optimism about the technology, tendency to innovate, discomfort with technology and inherent insecurity (Parasuraman & Colby, 2007). This construct adopted measures from the *2013 EPRG Public Opinion Survey: Smart Energy Survey – Attitudes and Behaviour* (Oseni et al., 2013) and tests consumer's perceptions and eagerness when adopting new technologies. The study conducted in the UK found that the majority of respondents prefer to collect and analyse information and then weigh the pros and cons before making a decision about the adoption of a new technology; this has been confirmed in this research study as well as can be seen in the frequency table below (51.90% of the respondents prefer to collect and analyse information and then weigh the pros and cons). This indicates that the provision of insightful information about smart metering technology as a potential energy-saving device can influence people's decision about its adoption.

Which of the following best describes your typical reaction to new technologies?

		Frequency	Percent	Valid Percent	Cumulative Percent
	I am always eager to try new ideas and products regardless of what others say	22	10.5	10.5	10.5
	I am keen to try out new products early if I have heard some positive reviews	41	19.5	19.5	30.0
	I like to collect more information and weigh the pros and cons	109	51.9	51.9	81.9

	I make my decisions after my friends have (rely on others' views)	15	7.1	7.1	89.0
	I am reluctant to adopt new technologies regardless of what others say	22	10.5	10.5	99.5
	None of the above	1	.5	.5	100.0
	Total	210	100.0	100.0	

Table 52: Frequency of Eagerness to Try New Technologies Responses

Expectation of Others' Cooperation: Consumers are often dictated by social norms and by their expectation of whether others will embrace new technologies. If consumers expect others to adopt new technologies and embrace new behaviours then other consumers are likely to imitate this and will be more willing to adopt the technology, which in this context is the PPMSS. This construct will be measured by adapting Wiener and Doescher's items using a likert scale as also used and cited in (Gupta & Ogden, 2009). If consumers expect others to adopt new technologies and embrace new behaviours, then other consumers are likely to imitate this and will be more willing to adopt the technology.

To what extent do you agree or disagree with the following statement:

- **Most household consumers are willing to make sacrifices to conserve energy**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	1	.5	.5	.5
	Disagree	36	17.1	17.1	17.6
	Neither Agree nor Disagree	54	25.7	25.7	43.3
	Agree	99	47.1	47.1	90.5
	Strongly Agree	20	9.5	9.5	100.0
	Total	210	100.0	100.0	

Table 53: Frequency for Environmental Consciousness Responses

47.10% of the respondents agreed that most household consumers are willing to make sacrifices to conserve energy.

Hypothesis: The more consumers expect that others are willing to make sacrifices to conserve energy then the more willing they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.985	.359		5.526	.000
	To what extent do you agree or disagree with the following statements: -Most household consumers are willing to make sacrifices to conserve energy	.214	.100	.147	2.139	.034

Table 54: Regression for Expectation of Others' Cooperation

Result: The bivariate results indicated that the expectation of others' cooperation (i.e. the belief that most other household consumers are willing to make sacrifices to conserve energy) had a significant impact ($p = 0.034$, $t = 2.139$, $\beta = 0.147$, $r = 0.130$ (small effect size)) on the willingness to adopt the PPMSS.

Perceived Efficacy (Locus of Control): This construct tests the individual's perception of whether they have the ability to bring about change through their own behaviour. A strong internal locus of control means that they perceive that their actions can bring about change and their behaviours are less contingent on others' behaviours. On the other hand, people with an external locus of control believe that their actions are insignificant in the whole scheme of things and these changes can only be initiated by those in powerful positions (Hines et al., 1987). Those who believe that they are able to bring change through their own behaviour will be more likely to adopt the PPMSS.

To what extent do you agree or disagree with the following statements:

- **The energy conservation efforts of one person are useless as long as other people refuse to conserve**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	28	13.3	13.3	13.3
	Disagree	77	36.7	36.7	50.0
	Neither Agree nor Disagree	49	23.3	23.3	73.3
	Agree	40	19.0	19.0	92.4

	Strongly Agree	16	7.6	7.6	100.0
	Total	210	100.0	100.0	

Table 55: Frequency of Perceived Efficacy Responses 1/2

- **There is not much that one individual can do about energy conservation**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	38	18.1	18.1	18.1
	Disagree	117	55.7	55.7	73.8
	Neither Agree nor Disagree	26	12.4	12.4	86.2
	Agree	24	11.4	11.4	97.6
	Strongly Agree	5	2.4	2.4	100.0
	Total	210	100.0	100.0	

Table 56: Frequency of Perceived Efficacy Responses 2/2

Hypothesis: The stronger one's belief that they are able to bring change through their own behaviour (perceived efficacy) the more likely they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.048	.269		11.348	.000
	Perceived Efficacy	-.129	.102	-.087	-1.265	.207

Table 57: Regression for Perceived Efficacy

Result: The bivariate results indicated that perceived efficacy did not have a significant ($p = 0.207$, $t = -1.265$, $\beta = -0.087$, $r = 0.055$) impact on willingness to adopt the PPMSS. This shows that many people do not take the lead despite believing that their own actions can bring about change. This is similar to early adopters of technology, the majority of people are not early adopters of new technologies and usually the visionaries, the leaders and the most curious embrace these technologies first.

Summary of Findings Pertaining to Consumer Psychology Factors

The table below summarizes the statistical findings regarding consumer psychological factors tested through regressions and the corresponding effect sizes (Cohen, 1988).

As can be seen environmental consciousness, emotional involvement such as happiness, anger, fear and guilt, direct feedback and expectation of others' cooperation were all significant factors. In contrast, engagement in current energy curbing behaviours, engagement in bill auditing energy curbing behaviours, the replacement of energy efficient appliance before they break, investment in solar panels and perceived efficacy were all found to not be significant.

Bivariate Regression Results

Independent Variables	t Statistic	Beta Standardized	Significance	Adjusted R Squared	Adjusted R	Effect Size
Environmental Consciousness	2.016	0.138	0.045	0.014	**0.118**	Small
Happiness	-2.613	-0.178	0.010	0.027	**0.164**	Small
Anger	2.430	0.166	0.016	0.023	**0.152**	Small
Fear	1.985	0.136	0.048	0.014	**0.118**	Small
Guilt	3.685	0.248	0.000	0.057	**0.239**	Small to Medium
Current Energy Curbing Behaviours	0.086	0.006	0.931	0.005	**0.071**	
Bill Auditing Energy Curbing Behaviours	1.670	0.115	0.096	0.008	**0.089**	
Replacement of Energy Efficient Appliances Before they Break	-1.152	-0.08	0.251	0.002	**0.045**	
Investment in Solar Panels	-0.837	-0.058	0.404	0.001	**0.032**	
Direct Feedback	7.246	0.449	0.000	0.198	**0.445**	Medium to Large
Expectation of Others' Cooperation	2.139	0.147	0.034	0.017	**0.130**	Small
Perceived Efficacy	-1.265	-0.087	0.207	0.003	**0.055**	

Table 58: Summary of Consumer Psychology Regression Findings

An ANOVA test found that there was a marginal significant effect of indirect feedback, i.e., the frequency the energy consumer checks the meter reading on the willingness to adopt the PPMSS at the p <0.050 [F (4, 205) = 2.291, p = 0.061].

FINANCIAL FACTORS

The next cluster of variables to be examined for their effect on willingness to adopt PPMSS are financial factors, starting with concerns about being able to pay bill due to rising energy prices.

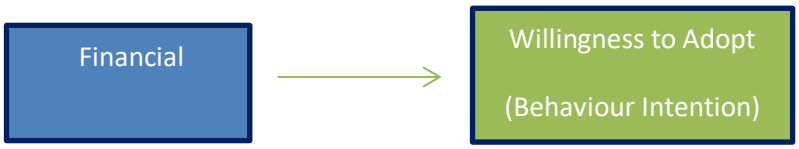

Figure 11: Financial Factors' Impact on Willingness to Adopt the PPMSS

The table below indicates the descriptive statistics for the financial factors:

Factors	N	Range	Mean	Standard Deviation	Variance Statistic	Skewness Statistics
Concern About Paying Bill Due to Rising Prices	210	4	2.7714	1.40918	1.986	0.309
Electricity Bill for Last Quarter	202	9	5.02	1.777	3.159	1.069
Complaint to Energy Ombdudsman	210	5	4.05	0.937	0.878	-0.835
Putting Off Paying Household Expenditure to Pay for Energy Bill	210	4	1.57	0.906	0.821	1.553
Energy Bill Savings	210	5	3.41	1.794	3.219	0.352
Financial Locus of Control	210	6	4.13	1.671	2.792	-0.019

Table 59: Descriptive Statistics for Financial Factors Tested

Concern About Being Able to Pay Bill Due to Rising Energy Prices: As rising energy prices are a reality in Australia respondents will be asked how concerned they are about being able to pay their energy bill due to rising energy prices. This will indicate how much of a 'stressor' energy bills are for residential households. A similar measure has been used in a national Australian survey conducted by (Ernst & Young, 2014). The more stressed consumers are about paying their bills

the more likely it is that they will be willing to adopt the budgeting tool that the PPMSS provides.

On a scale of 1 to 5 how concerned are you about paying your electricity bill?

		Frequency	Percent	Valid Percent	Cumulative Percent
	1.00 - Not Concerned at All	45	21.4	21.4	21.4
	2.00 – Occasionally Concerned	67	31.9	31.9	53.3
	3.00 – Often Concerned	24	11.4	11.4	64.8
	4.00 – Always Concerned	39	18.6	18.6	83.3
	5.00 – Always Extremely Concerned	35	16.7	16.7	100.0
	Total	210	100.0	100.0	

Table 60: Frequency of Concern About Paying Energy Bill Responses

21.40% of respondents are not concerned at all about paying their energy bill, 31.90% are occasionally concerned, 11.40% are often concerned, 18.60% are always concerned and 16.70% are always extremely concerned. This indicates that consumers are generally concerned about paying their energy bill due to rising energy prices.

Hypothesis: The more concerned the consumer is about paying their energy bill the more likely they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	2.508	.200		12.518	.000
	On a scale of 1 to 5 how concerned are you about paying your electricity bill? - Concern about paying your energy bill	.079	.064	.085	1.232	.219

Table 61: Regression for Concern About Paying Energy Bill

Result: The bivariate results indicated that the consumers' concern about paying their electricity bill did not have a significant impact ($p = 0.219$, $t = 1.232$, $\beta = 0.085$, $r = 0.045$) on willingness to adopt the PPMSS. This indicates that consumers may be feeling concerned but are not feeling 'stressed enough' or enough of a pinch in the rising prices for them to intend to act on their concern by being willing to adopt the PPMSS.

Current Estimated Electricity Consumption: Respondents will be asked how much their bill was for the last quarter in dollar terms at their primary place of residence, assuming they do not take the benefit of solar into account.

How much was your electricity bill for the last quarter at your primary place of residence excluding any solar benefit you may receive?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Do not know	8	3.8	3.8	3.8
	Less than $100	8	3.8	3.8	7.6
	$101 - $200	19	9.0	9.0	16.7
	$201 - $300	67	31.9	31.9	48.6
	$301 - $400	48	22.9	22.9	71.4
	$401 - $500	25	11.9	11.9	83.3
	$501 - $600	14	6.7	6.7	90.0
	$601 - $700	12	5.7	5.7	95.7
	$701 - $800	3	1.4	1.4	97.1
	$801 - $900	3	1.4	1.4	98.6
	More than $900	3	1.4	1.4	100.0
	Total	210	100.0	100.0	

Table 62: Frequency for Electricity Bill for Last Quarter Responses

31.90% of the consumers had an electricity bill of $201 - $300 per quarter, 22.90% had an electricity bill of $301 - $400 per quarter and 11.90% had an electricity bill of $401 - $500 per quarter.

Hypothesis: The higher one's electricity bill the more likely they will be to adopt the PPMSS.

The researcher removed the 8 'I don't know cases' and based the analysis on 202 respondents.

Test of Homogeneity of Variances			
Willingness to Adopt Prepaid Solution			
Levene Statistic	df1	df2	Sig.
2.052	9	192	.036

Levene's test is significant in this instance, which means that variances are not homogenous.

ANOVA					
Willingness to Adopt Prepaid Solution					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.074	9	2.119	1.274	.253
Within Groups	319.505	192	1.664		
Total	338.579	201			

Table 63: ANOVA for Electricity Bill

Result: There was not a significant effect of the electricity bill on willingness to adopt the PPMSS at
p <0.050 [F (9, 192) = 1.274, p = 0.253]. This indicates that consumers can not assess their energy usage behaviour through social learning if they do not have access to Sustainabl HCI Technologies hence this indicates that they can not change their energy usage behaviours unless they have personally tried the product.

Hardship: Vulnerable groups such as pensioners, those on low incomes and single parents experience the most hardship when it comes to paying energy bills (McKenzie, 2013). This construct will assess whether the respondent has experienced any hardship by seeing whether they deferred other payments to pay for their energy bill (Young, 2006), complained to the Ombudsman or Energy Provider (Oseni et al., 2013) or if they have received outside help to pay for the electricity bill (O'Sullivan et al., 2013). Those consumers who experience hardship are more likely to adopt the PPMSS.

Have you complained to the Energy Ombudsman or energy provider in the last year and what was the main reason of the complaint if so?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes, my bill was too high because I was charged too much.	8	3.8	3.8	3.8
	Yes, my bill was delayed and not on time.	6	2.9	2.9	6.7
	Yes, my bill was not detailed enough or understandable.	4	1.9	1.9	8.6
	No, I did not have a problem.	159	75.7	75.7	84.3
	No, even though I had an issue I did not report it to the Energy Ombudsman or the energy provider.	16	7.6	7.6	91.9
	I did not know there was an Energy Ombudsman	17	8.1	8.1	100.0
	Total	210	100.0	100.0	

Table 64: Frequency of Reason of Complain to Energy Ombudsman Responses

Hypothesis: If the consumer has complained to the Ombudsman then they will be more likely to adopt the PPMSS.

Tests of Between - Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.708[a]	5	1.142	.654	.658	.016
Intercept	445.731	1	445.731	255.547	.000	.556
Q19 - Complaints to Ombudsman	5.708	5	1.142	.654	.658	.016
Error	355.821	204	1.744			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .016 (Adjusted R Squared = -.008)						

Table 65: ANOVA for Complaints to Ombdusman

Result: There was a not significant effect of complaints to the Ombudsman on willingness to adopt the PPMSS at the p <0.050 level for the conditions tested [F (5, 204) = 0.654, p = 0.658].

How often do you put off paying household expenditure like rent, groceries, school fees etc. to pay for your electricity bill?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Never	138	65.7	65.7	65.7
	Rarely	36	17.1	17.1	82.9
	Sometimes	27	12.9	12.9	95.7
	Most of the Time	7	3.3	3.3	99.0
	Always	2	1.0	1.0	100.0
	Total	210	100.0	100.0	

Table 66: Frequency of Deferment of Household Expenditure to Pay Energy Bill Responses

65.70% of consumers never put off other household bills to pay for their energy bill, which indicates that they are not experiencing hardship when it comes to paying their electricity. 17.10% of consumers rarely put off other household bills to pay for their energy bills. 12.90% sometimes do this, 3.30% do this most of the time and only 1.00% do this all the time.

Hypothesis: The more the consumer puts off paying household expenditures to pay for their electricity bill the more likely they will be to adopt the PPMSS.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.571	.182		14.154	.000
	How often do you put off paying household expenditure like rent, groceries, school fees etc. to pay for your electricity bill?	.101	.100	.069	1.004	.316
a. Dependent Variable: Willingness to Adopt Prepaid Solution						

Table 67: Regression for Deferment of Paying Other Household Expenditure to Pay for Electricity Bill

Result: The bivariate results indicated that the more frequently the consumer puts off paying household expenditure like rent, groceries, school fees etc. to pay for their electricity bill did not have a significant impact ($p = 0.316$, $t = 1.004$, $\beta = 0.069$, $r = 0.001$) on willingness to adopt the PPMSS. This could be because approximately 2/3 of the respondents never have to put off paying other household expenditure to pay for their electricity bill.

Have you received any of the following outside help to pay for your electricity bill in the last year? You can choose more than one response:

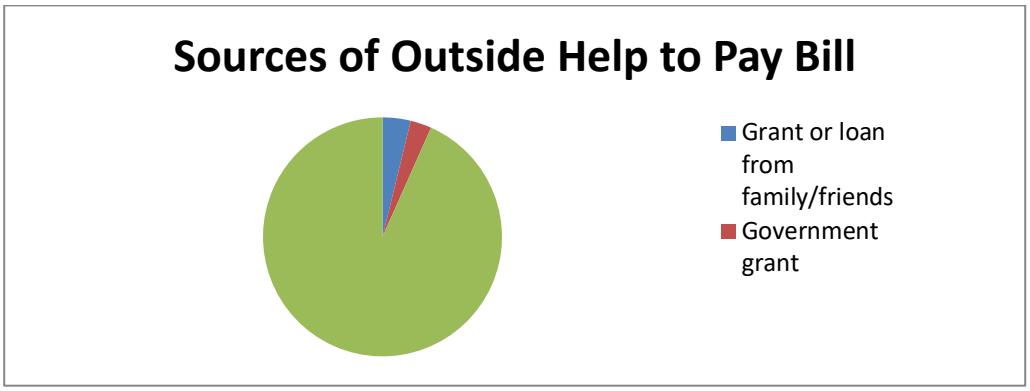

Figure 12: Sources of Outside Help to Pay Bill

The majority of respondents do not seek sources of outside help to pay for their electricity bill. This shows that this sample does not experience much hardship financially. This information is purely insightful to see if the sample of respondents are experiencing hardship and as such seeking external sources to pay for their energy bill.

Control Over Energy Expenditure (Financial Locus of Control): This construct examines the consumer's financial locus of control by assessing how customers feel in regards to managing their bill in the post-paid billing structure, i.e., bill shock, the consumer's understanding and preference of tariff structures e.g. TOU (Young, 2006) (Simcock et al., 2014), the consumer's desired frequency of payments for energy (Fischer, 2008; Kempton & Layne, 1994) and the consumer's knowledge of whether they are being billed using actual versus estimated meter readings (McKerracher & Torriti, 2012; Pyrko & Darby, 2010) The researcher touched on these questions in the focus group but the interpretation in the analysis below is limited by the questions asked.

A) Financial Locus of Control in Post Paid Billing Structure

Most people receive a bill every quarter after they use electricity. Under this model how difficult do you feel it is to manage and control your electricity usage?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Very Difficult (I have no control over my bill and often receive bill - shock)	17	8.1	8.1	8.1
	Difficult	18	8.6	8.6	16.7
	Somewhat Difficult	31	14.8	14.8	31.4
	Neutral	69	32.9	32.9	64.3
	Somewhat Easy	28	13.3	13.3	77.6
	Easy	24	11.4	11.4	89.0
	Very Easy (I have complete control over my electricity usage)	23	11.0	11.0	100.0
	Total	210	100.0	100.0	

Table 68: Frequency of Financial Locus of Control in Post-Paid System Responses

The responses in qualitative research substantiate the quantitative data and indicate mixed views about the level on control or 'bill shock' experienced in the

quarterly post-paid system, when asked “most people receive a bill every quarter after they use electricity; under this current system do you feel you have control in the management of your electricity usage?” The relevant qualitative responses were as follows:

- F2: “Yes, to a certain degree as I always turn off appliances/lights that are not being used so we don’t use electricity unnecessarily.”
- F4: “No because I receive the bill every quarter so don’t really know what my consumption is until I receive my bill. Furthermore, receiving the bill on a quarterly basis and not on a monthly basis - one tends to forget about their electricity usage.”
- F5: “No, I do not feel like I am in complete control of my usage as energy is often out of sight out of mind and I use it while I do other necessary tasks. The issue is that I am conservative and often switch off lights but I cannot necessarily always control the behaviours of my other family members and guests when they stay over.”
- F6: “Receiving a bill every quarter does not make me feel in control of my electricity usage. In this way, it is hard to estimate which appliance mostly contributing in the bill.”
- F9: “No, you use your electricity and the bill comes afterwards so you do not have control of what you are spending.”
- M4: “No, there is no management through this process. The only way to have control is to have a live feed of used electricity.”
- M7: “I don’t feel very in control with the meter usage system and the only control I feel I have is seeing my usage pattern in the bar graph.”
- M8: “Yes we have always had the same system so I suppose our level of control has always stayed the same.”
- M9: “No. Too long in interval to change habits. If people can get real live data or set more appropriate - short time targets - easier to change habits.”
- M11: “Yes, even though I’m not sure how much the bill will amount to? Being in control of energy use is about having the right habits, e.g. turning off lights when leaving the room.”

Hypothesis: The more control the consumer feels that they have in the post-paid system the less likely they will be to adopt the PPMSS.

Regression Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.988	.242		12.336	.000
	Control in Post Paid Model	-.063	.054	-.080	-1.155	.249

Table 69: Regression for Financial Locus of Control in Post-Paid System

Result: The bivariate results indicated that the level of financial locus of control that the consumer has in a post-paid system does not have a significant impact ($p = 0.249$, $t = -1.155$, $\beta = -0.080$, $r = 0.045$) on willingness to adopt the PPMSS. This indicates that consumers feel that they have some degree of control in managing their electricity usage and they do not find this difficult. This also indicates that bill shock does not necessarily mean that the consumer will be more willing to adopt the PPMSS. Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. These results show that consumers in this sample are analogous to the frog in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react until they boiled to death (Kollmuss & Agyeman, 2002). In this case, consumers are not reacting to the incremental rise in pricing and hence still feel that they have control of their energy usage, they may be managing their expectations by expecting a high bill as prices have gone up. For example, when M6 was asked how he reacts when he receives his energy bill he revealed the following reaction, "[o]h great the electricity bill is in. How much is it this time? I don't feel surprised when I get them."

B) Consumer's Understanding and Preference of Tariff Structure

If you could, how would you like to be charged for electricity?

		Frequency	Percent	Valid Percent	Cumulative Percent
	I would like to be charged at a set rate no matter what time of the day it is	76	36.2	36.2	36.2
	I would like to be charged more or less depending on the time of the day I use electricity i.e. the price will be cheaper when less people are using electricity at that time	66	31.4	31.4	67.6
	I would like to be charged a certain amount for the first 1000 KWHS and charged at a higher rate if I use more than 1000 KWHS in the billing cycle	32	15.2	15.2	82.9
	These options are too confusing to compare	36	17.1	17.1	100.0
	Total	210	100.0	100.0	

Table 70: Frequency of Consumer Preference of Tarrif Structure Responses

36.20% of the sample would like to be charged at a set rate no matter what time of the day it is (fixed rate), 31.40% of the sample would like to be charged more or less depending on the time of the day electricity is used i.e. the price would be cheaper when less people are using electricity at that time (time-of-use rate), 15.20% would like to be charged a certain amount for the first amount of KWHS and charged at a higher rate if they use more than the specified first amount of KWHS in the billing cycle (inclining block rate) and 17.10% found these options too confusing to compare.

According to the focus group many of the participants preferred a fixed tariff and a time of use one and some indicated their confusion about the different tariff options. The time of use tariff is significant in the smart metering context because it is the most common tariff structure programmed in smart meters to promote consumers to adjust their behaviour and use less at peak demand periods and hence to reduce their impact on the grid.

C) Desired Frequency of Payments in Prepaid Mode

If you had a choice, how often would you like to make payments for your energy usage in prepaid mode?

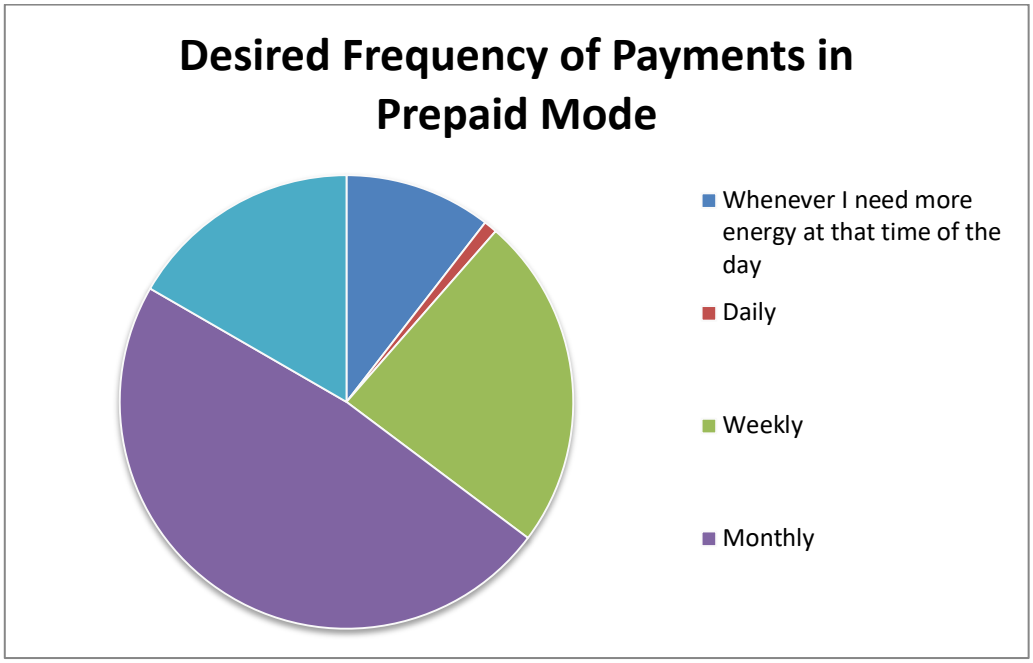

Figure 13: Desired Frequency of Payments in Prepaid Mode

The traditional system often bills utility consumers quarterly. The research results show that consumers desire more frequent billing options. For example, F4 from the focus group explained "…. I receive my bill every quarter so don't really know what my consumption is until I receive my bill. Furthermore, receiving the bill on a quarterly basis and not on a monthly basis – one tends to forget about their electricity usage." According to the survey, 48.10% would like to be billed monthly, 23.80% would like to billed weekly, 16.70% would like to still be billed quarterly, 10.50% would like to be able to purchase more electricity whenever they need more in any desired day and only 1.00% would like the frequency to be daily. Purchasing electricity in prepaid mode enables consumers to control the frequency of payments they make and as such enables them to budget by monitoring, measuring and managing their energy usage and cash flow.

D) Consumer's Knowledge of Whether they Are Being Billed Using Actual or Estimated Meter Readings

Are you currently being billed for your energy by your energy provider or Body Corporate / Owners Corporation based on actual or estimated meter readings?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Actual meter readings for sure	110	52.4	52.4	52.4
	Estimated meter readings for sure	16	7.6	7.6	60.0
	I assume actual meter readings	57	27.1	27.1	87.1
	I assume estimated meter readings	1.9	1.9	89.0	
	I honestly do not know	11.0	11.0	100.0	
	210	100.0	100.0		

Table 71: Frequency of Knowledge of Billing of Energy Based on Estimated or Actual Readings Responses

This is not used in hypothesis testing but is merely used to indicate whether consumers are aware whether they are being billed according to actual or estimated meter reads. 52.40% of the respondents reported that their bills are based on actual meter readings for sure, 27.10% assume that they are based on actual meter readings.

According to the focus group many consumers are uncertain as to whether they are being charged based on actual or estimated usage. Some respondents mentioned that they do not see someone checking their meter.

The next two constructs differ in their hypothesis in that the questions are worded using the assumption that the respondents are already willing to adopt the PPMSS. The purpose of the question is to retrieve some insightful information as to their main driver of wanting to adopt i.e. is this a financial

motive and to see whether they would be willing to pay a premium for the enhanced features of the solution.

Energy Bill Savings: Evidence suggests that an in-home display combined with prepayment initiates a behaviour change in users (Faruqui et al., 2010), which results in the reduction of energy use of up to 54% (Australian Government, 2013). Therefore, this means that the energy consumer has a financial incentive to implement a prepaid meter as it makes energy visible and audible to the consumer. Energy consumption no longer is out of sight and out of mind, which means that the consumer is likely to save money on their bill depending on their usage habits beforehand. Therefore, the most likely reason the consumers would adopt the PPMSS is due to a financial motivation.

If you were to adopt a prepaid meter which of the following would best describe your reason (check only one)?

		Frequency	Percent	Valid Percent	Cumulative Percent
	A prepaid smart meter would make energy purchasing more convenient and efficient	25	11.9	11.9	11.9
	A prepaid smart meter will allow me to be in control of my destiny by managing my electricity consumption on my own	65	31.0	31.0	42.9
	A prepaid smart meter will allow me to seek the best financial rewards and savings on my energy bills	40	19.0	19.0	61.9
	A prepaid smart meter appeals to my desire to test new technologies	9	4.3	4.3	66.2
	A prepaid smart meter will create an educational experience for my entire family	21	10.0	10.0	76.2
	A prepaid smart meter will simplify the energy purchasing process by making energy billing more understandable and transparent	50	23.8	23.8	100.0
	Total	210	100.0	100.0	

Table 72: Frequency of the Main Reason for the Adoption of the PPMSS Responses

31.00% of the respondents believe that the primary reason they would adopt the solution is because a prepaid smart meter would allow them to be in control of their destiny by managing their electricity consumption on their own. The second

most common reason chosen by 23.80% of the respondents was that a prepaid smart meter would simplify the energy purchasing process by making energy billing more understandable and transparent. 19.00% of the respondents recognised that a prepaid smart meter would allow them to seek the best financial rewards and savings on their energy bill which indicates that more consumers need to be educated on the fact that behavioural change impacts the financial reward and savings of energy consumers through the use of the PPMSS.

Please note that this hypothesis differs from the others as the question already assumes a willingness to adopt. The purpose of this question is to explore whether the main purpose of adoption is a financial motivation. Although some consumers chose that they would be financially motivated to save money by seeking the best financial rewards through the use of the PPMSS, this is not the most common reason that consumers are being drawn to, rather it is their financial locus of control by being in control of their utility destiny by having the ability to manage their electricity consumption on their own.

The researcher acknowledges that if they were to amend the way this survey question has been asked they would do this on a 5-point scale to gain more insightful information. “If you were to adopt the PPMSS, how important would the following have been to you when making the decision?”

PPMSS Price Premium: Previous research has discovered that consumers have an inherent preference to prepay for one-off hedonic consumption and to post pay for durable utilitarian consumption (Prelec & Loewenstein, 1998) cited in (Patrick & Park, 2006). Many consumers prepay for goods and services, as this option is available to consumers as sellers are finding prepayment a viable and profitable business model. It is in the best interests of businesses to have consumers pay as early as possible (Xie & Shugan, 2001). The prepaid revolution is defusing into the energy sector in the same way it has in the financial, telecommunications, transportation and retail sector and point-of-use billing is reshaping energy transactions.

Patrick and Park (2006) found that utilitarian consumption encourages a strong preference for post payment. This article states that encouraging consumers to prepay for utilitarian consumption is an area of future investigation and as such this will be addressed in this research project. One proposed tactic is to add a strong hedonic dimension to a utilitarian product as this not only enhances or augments the functional utility derived from the product but increases consumers' savouring and anticipation for consumption. Therefore, adding a hedonic element will mean that consumers will be willing to prepay even at a premium price. There is limited research in the marketing literature that addresses the notion of advance buying from the consumer's standpoint (Patrick & Park, 2006).

In the context of advance buying of energy, the notion of paying a premium has been embraced in Tasmania on *Aurora Energy Pay-As-You-Go* customers. This landmark paper carried out for the Tasmanian Council of Social Service is significant because predominantly urban consumers embraced the prepaid metering technology and were willing to pay a premium for the added benefits that came with the use of the solution, i.e., fair, accurate and transparent billing, when compared to the post-paid billing system. Even vulnerable customers such as pensioners and single parents wanted to pay a premium for this solution despite being inconvenienced by needing to go outside to top up the meter and to go to a local store to obtain credit and many were satisfied with the feedback information. Therefore, it can be argued that if Tasmanians were willing to pay a premium with very basic utilitarian functions then the even more convenient PPMSS with advanced and 'fun' functionalities (hedonic elements) will revolutionise the energy consumer's experience and such they will be willing to pay a premium for this solution (Young, 2006).

Assuming you have chosen to adopt the prepaid metering solution over the post-paid option available would you be willing to pay more for this solution after considering the features above?

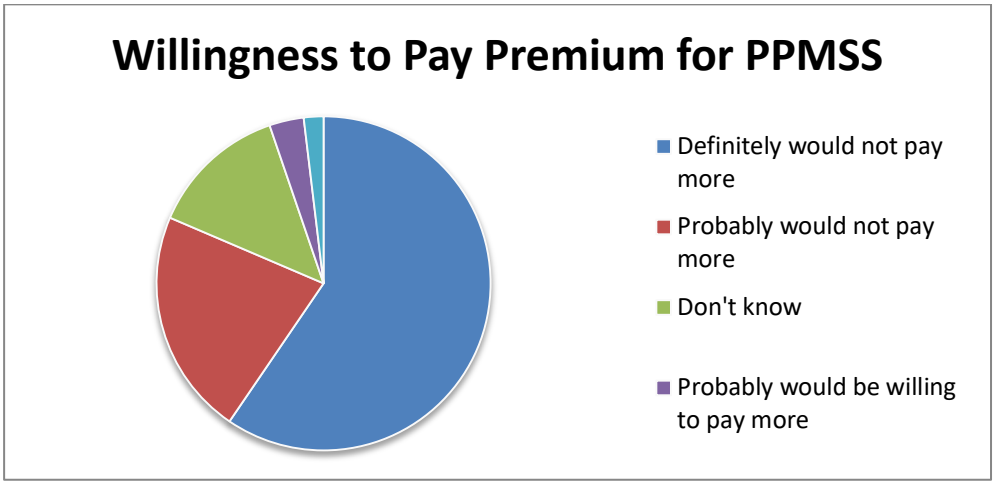

Figure 14: Willingness to Pay Premium for PPMSS

Please note that this hypothesis differs from the others as the question already assumes a willingness to adopt. The purpose of this question is to explore whether consumers will be willing to pay a premium for this solution. Over 75.00% of the respondents probably and definitely would not be willing to pay more for the additional features that the PPMSS provides.

Summary of Findings Pertaining to Financial Factors

The table below summarizes the statistical findings regarding financial factors tested through regressions.

Bivariate Regression Results

Independent Variables	t Statistic	Beta Standardized	Significance	Adjusted R Squared	Adjusted R	Effect Size
Concern About Paying Bill	1.232	0.085	0.219	0.002	**0.045**	N/A
Financial Locus of Control	-1.155	-0.080	0.249	0.002	**0.045**	N/A
Putting Off Other Household Expenditures to Pay Energy Bill	1.004	0.069	0.316	0.000	**0.000**	N/A

Table 73: Summary of Financial Regression Findings

Interestingly, the bivariate results indicated that the consumers' concern about paying their electricity bill did not have a significant impact on willingness to adopt the PPMSS. This indicates that consumers may be feeling concerned but are not feeling 'stressed enough' or enough of a pinch in the rising prices for them to intend to act on their concern by being willing to adopt the PPMSS.

The level of financial locus of control that the consumer has in a post-paid system does not have a significant impact on willingness to adopt the PPMSS. This indicates that consumers feel that they have some degree of control in managing their electricity usage and they do not find this difficult. This also indicates that bill shock does not necessarily mean that the consumer will be more willing to adopt the PPMSS. Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. These results show that consumers in this sample are analogous to the frog in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react until they boiled to death (Kollmuss & Agyeman, 2002). In this case, consumers are not reacting to the incremental rise in pricing and hence still feel that they have control of their energy usage, they may be managing their expectations by expecting a high bill as prices have gone up. For example, when M6 was asked how he reacts when he receives his energy bill he revealed the following reaction, "[o]h great the electricity bill is in. How much is it this time? I don't feel surprised when I get them."

The more frequently the consumer puts off paying household expenditure like rent, groceries, school fees etc. to pay for their electricity bill did not have a significant impact on willingness to adopt the PPMSS. This could be because approximately 2/3 of the respondents never have to put off paying other household expenditure to pay for their electricity bill.

The findings other than regression analysis were as follows:

- There was not a significant effect of the electricity bill on willingness to adopt the PPMSS at $p < 0.050$ [$F(9, 192) = 1.274$, $p = 0.253$].
- There was a not significant effect of complaints to the Ombudsman on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(5, 204) = 0.654$, $p = 0.658$].
- According to the survey, 48.10% would like to be billed monthly, 23.80% would like to billed weekly, 16.70% would like to still be billed quarterly, 10.50% would like to be able to purchase more electricity whenever they need more in any desired day and only 1.00% would like the frequency to be daily. Purchasing electricity in prepaid mode enables consumers to control the frequency of payments they make and as such enables them to budget by monitoring, measuring and managing their energy usage and cash flow.
- 31.00% of the respondents believe that the primary reason they would adopt the solution is because a prepaid smart meter would allow them to be in control of their destiny by managing their electricity consumption on their own. The second most common reason chosen by 23.80% of the respondents was that a prepaid smart meter would simplify the energy purchasing process by making energy billing more understandable and transparent. 19.00% of the respondents recognised that a prepaid smart meter would allow them to seek the best financial rewards and savings on their energy bill which indicates that more consumers need to be educated on the fact that behavioural change impacts the financial reward and savings of energy consumers through the use of the PPMSS.
- Over 75.00% of the respondents probably and definitely would not be willing to pay more for the additional features that the PPMSS provides.

PRODUCT FACTORS

The next cluster of variables to be examined for their effect on willingness to adopt PPMSS are product factors.

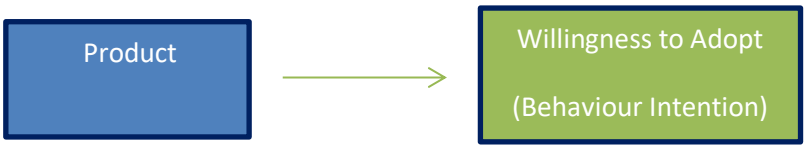

Figure 15: Product Factors' Impact on Willingness to Adopt the PPMSS

Perception/Knowledge of Prepayment: This construct will explore what pre-existing use consumers have had of prepaid services in general (Wimberly, 2014) and in particular their perception and past use of prepaid utility meters (Wimberly, 2014).

Please select if you have ever purchased any of the following prepaid plans or services?

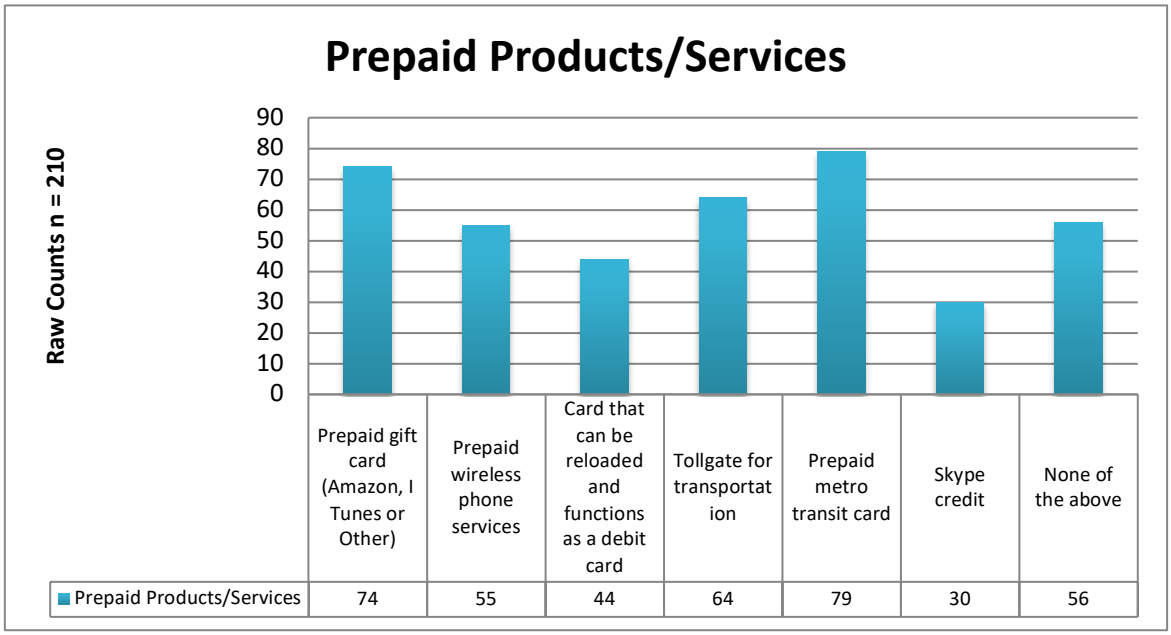

Figure 16: Prepaid Products/Services Previously Used by Respondents

Results: The most common prepaid services used were prepaid metro transit cards, prepaid gift cards and tollgate for transportation.

Convenience: Prepaid meters have proven to be a successful tool for consumer engagement in markets where their use is extensive. Consumers need to experience convenience for the concept of a PPMSS to take off and become more accepted in Australia as this is a key barrier to the mass adoption of virtually any technology (Accenture, 2011a). This construct will explore whether the consumer is currently finding the post-paid billing environment convenient by exploring their knowledge of their current meter location (Froehlich, 2009) (Wood & Newborough, 2003) and whether they have access to an in-home energy visual display (Darby, 2006a). The PPMSS is more convenient than 'dumb' or 'semi-smart' keypad or magnetic prepaid meters where consumers must go outside the home to replenish their energy credit. The growth in popularity of the Internet and internet enable devices enable consumers to top up their energy from the comfort of their couches rather than having the only option of going to a physical store to purchase a scratch card, token or load credit on a magnetic card. The PPMSS also ensures that the consumer has an in home visual display and credit is automatically loaded once a purchase is made. The more convenience experienced by the consumer the more likely they will be to adopt the PPMSS.

A) Meter Location

Where is the energy provider's traditional meter currently located at your primary place of residence?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Inside the home	8	3.8	3.8	3.8
	Outside the home, outside the building	184	87.6	87.6	91.4
	Outside my home in a cupboard or utility room located within the building which I do not have access to	16	7.6	7.6	99.0
	I don't know	2	1.0	1.0	100.0
	Total	210	100.0	100.0	

Table 74: Frequency of Current Meter Location Responses

87.62% of the respondents sampled have a meter located outside their home, outside the building. 7.60% of the sample has a meter located outside their

home in a cupboard or utility room located within their building of residence, which they do not have access to. This indicates that the meter location is not in a convenient location for consumers and promotes energy use being out of site and mind. The focus group respondents also substantiated this view as many respondents remarked that their meters are located outside of their homes and due to its location, many consumers often do not physically check the meter reading on their meters.

Hypothesis: The less accessible the meter is located the more likely the willingness to adopt the PPMSS.

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6.469[a]	3	2.156	1.251	.292	.018
Intercept	231.808	1	231.808	134.491	.000	.395
Q16 – Location of Main Meter	6.469	3	2.156	1.251	.292	.018
Error	355.060	206	1.724			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .018 (Adjusted R Squared = .004)						

Table 75: ANOVA for Meter Location (Convenience)

Results: There was not a significant effect on the meter location on willingness to adopt the PPMSS at p <0.050 [F (3,206) = 1.251, p = 0.292].

B) Accessibility to Meter Display

Do you currently have access to an in-home energy visual display which shows how much electricity you are using live?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	30	14.3	14.3	14.3
	No	156	74.3	74.3	88.6
	I don't know	24	11.4	11.4	100.0
	Total	210	100.0	100.0	

Table 76: Frequency of Accessibility to Meter Display Responses

74.30% of the sample does not have access to an in-home energy visual display, which indicates that many consumers are unable to effectively monitor their household energy usage as they inconveniently do not have access to a

monitor display, in the home, which enables them to monitor, measure and hence manage their electricity usage.

Hypothesis: If the consumer does not have an in-home energy visual display then they will be more willing to adopt the PPMSS

Tests of Between-Subjects Effects

Dependent Variable: Willingness to Adopt Prepaid Solution

Source	Type III Sum of Squares	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.877[a]	1.438	.830	.437	.008
Intercept	891.366	891.366	514.462	.000	.713
Q24 – In home display	2.877	1.438	.830	.437	.008
Error	358.652	1.733			
Total	1925.000	210			
Corrected Total	361.529	209			

a. R Squared = .008 (Adjusted R Squared = -.002)

Table 77: ANOVA for Accessibility to In House Display

Results: There was not a significant effect on the presence of an in home display on willingness to adopt the PPMSS at the p <0.050 level for the conditions tested [F (2,207) = 0.830, p = 0.437].

Availability of PPMSS: This construct will assess whether consumers would be willing to adopt the PPMSS from the local energy provider and/or from a third party provider so that they are able to audit the energy provider's bill. Accenture's *Revealing the Values* survey demonstrated that consumers are open to receiving and buying various electricity related products and services from potential new market players (Accenture, 2011a). If the PPMSS is available from third party providers, other than the Energy Retailers, then consumers will be more willing to adopt the PPMSS.

Descriptive Statistics							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Adoption of Solution	210	1	1.28	.451	.203	.982	.168
Valid N (listwise)	210						

Table 78: Descriptive Statistics for the Availability of the PPMSS

If you were to adopt the prepaid smart metering solution would you be most likely to adopt the solution if it was offered by your utility supplier or would you be more inclined to buy one from a third-party supplier so that you can audit and check the charges of the energy provider's meter?[1]

		Frequency	Percent	Valid Percent	Cumulative Percent
	Energy Supplier	151	71.9	71.9	71.9
	Third Party - Auditing purposes	59	28.1	28.1	100.0
	Total	210	100.0	100.0	

Table 79: Frequency for the Availability of the PPMSS from Energy Supplier or Third Party Provider Responses

71.90% of the respondents sampled would prefer to adopt a prepaid solution from the energy supplier. Focus group respondent M10 noted that: "it should be part of the service provided by my energy company because after all it is a tool to reduce their administration overheads, which we already pay for via "service" charge. No meter reading, no sending bills, no chasing arrears. Surely there must be energy providers that see this as a value-added service to build and retain a customer base when compared with providers that don't have this option."

[1] The researcher acknowledges that this question may imply that utility companies will not allow you to audit and check charges but that 3rd providers will naturally build in this capability.

28.10% of the respondents sampled would prefer to adopt the solution from a third party. This viewpoint also arose in the focus group for example F5 mentioned “this would make the system more transparent and make the energy suppliers accountable for over charging. Many of the energy provider’s meters are old and not calibrated so I don’t think they measure very accurately. Also, this would be great for my mother who lives in a Body Corporate environment so that she only pays for what she uses. As the Body Corporate takes the entire usage of the building and splits it over the lots she always subsidises for other over users when she lives on her own, this is unfair as she lives a very minimalist life and she boils two pots of kettles a day! It is also unfair for investors who have vacant units for most of the year.” F8 mentioned, “you have to just trust the Energy Company on what you are using when you enquire. There is no way to fight and audit the bill if there is an error, which is annoying.”

F1, a respondent from the focus group mentioned that “it would be good to be able to trial it without “risking” current arrangements.” Adopting the solution from a third party as an auditing tool will allow this and as F9 mentioned it is a “system of proof if you need to dispute something in court against the ‘big guys’.”

Hypothesis: If the PPMSS is available from third party providers, other than the Energy Retailers, then consumers will be more willing to adopt the PPMSS.

ANOVA					
Willingness to Adopt the PPMSS					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.511	4	.128	.625	.645
Within Groups	41.913	205	.204		
Total	42.424	209			

Table 80: Regression for the Availability of the PPMSS from Third Party Providers

Results: There was not a significant effect on the availability of the PPMSS from third party providers on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(4, 205) = 0.625$, $p = 0.645$].

Distrust of Utility Providers: This construct tests the respondent's level of trust of utility providers (Pyrko & Darby, 2010). It is assumed that the more the consumer trusts the utility provider then the more likely the consumer will be to adopt the solution from them rather than a third party.

Do you trust your energy provider to inform you about actions you can take to optimise your electricity consumption?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	99	47.1	47.1	47.1
	No	66	31.4	31.4	78.6
	I don't know	45	21.4	21.4	100.0
	Total	210	100.0	100.0	

Table 81: Frequency of Trust of Energy Providers to Optimise Electricity Consumption Responses

47.00% of respondents trust their energy provider to assist them to optimise their electricity consumption. 31.40% said no they do not trust their energy provider and a remaining 45.00 % said that they do not know.

Hypothesis: The more the consumer trusts their energy provider to inform them about actions to optimise their electricity consumption, then the more likely they will be to adopt the PPMSS from them rather than a third party.

Group Statistics					
	Energy Provider to Inform of Decisions	N	Mean	Std. Deviation	Std. Error Mean
Willingness to Adopt Prepaid Solution	1.00 – Yes	99	2.96	1.384	.139
	2.00 – No	66	2.42	1.278	.157

Table 82: Descriptive Statistics for Trust of Energy Provider to Inform About Actions to Optimise Electricity Consumption

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	*Mean Difference*	*Std. Error Difference*	*95% Confidence Interval of the Difference*	
									Lower	*Upper*
Willingness to Adopt Prepaid Solution	Equal variances assumed	.531	.467	2.509	163	.013	*.535*	*.213*	*.114*	*.957*
	Equal variances not assumed			2.549	146.885	.012	*.535*	*.210*	*.120*	*.950*

Table 83: T Test for Trust of Energy Provider to Inform About Actions to Optimise Electricity Consumption

Result: The group of consumers who trust their energy provider to inform them about actions to optimise their electricity consumption (N = 99) on willingness to adopt the PPMSS (M = 2.96, SD = 1.384) was higher in comparison, the second group that answered no (N = 66) (M = 2.42, SD = 1.278).

As p = 0.467 is higher than 0.05 we can conclude that the variances are equal. The mean scores between the groups are significantly different t (163) = 2.509, p = 0.013.

Sources of Information for Energy-Saving Advice: This construct will assess where the respondent is most likely to seek energy saving advice from, e.g., online government website, online consumer group website, online energy supplier's website, online other source, utility provider, family, friends, neighbour, sales agent, work colleagues (Oseni et al., 2013)(Kuusela & Spence, 1999). Boardman and Darby (2000) and Green et al. (1998) both highlight the importance of a recipient trusting those who are providing advice if they are to subsequently act on this advice (Simcock et al., 2014) by adopting the PPMSS in this context. This data will not be used in hypothesis testing, but will provide insight into which sources of advice consumers trust the most to subsequently act on this advice. In this instance, which sources of 'advice' or 'education' are most effective in a marketing strategy for consumers to be willing to adopt the PPMSS?

Which, if any, of the following do you seek energy advice from?

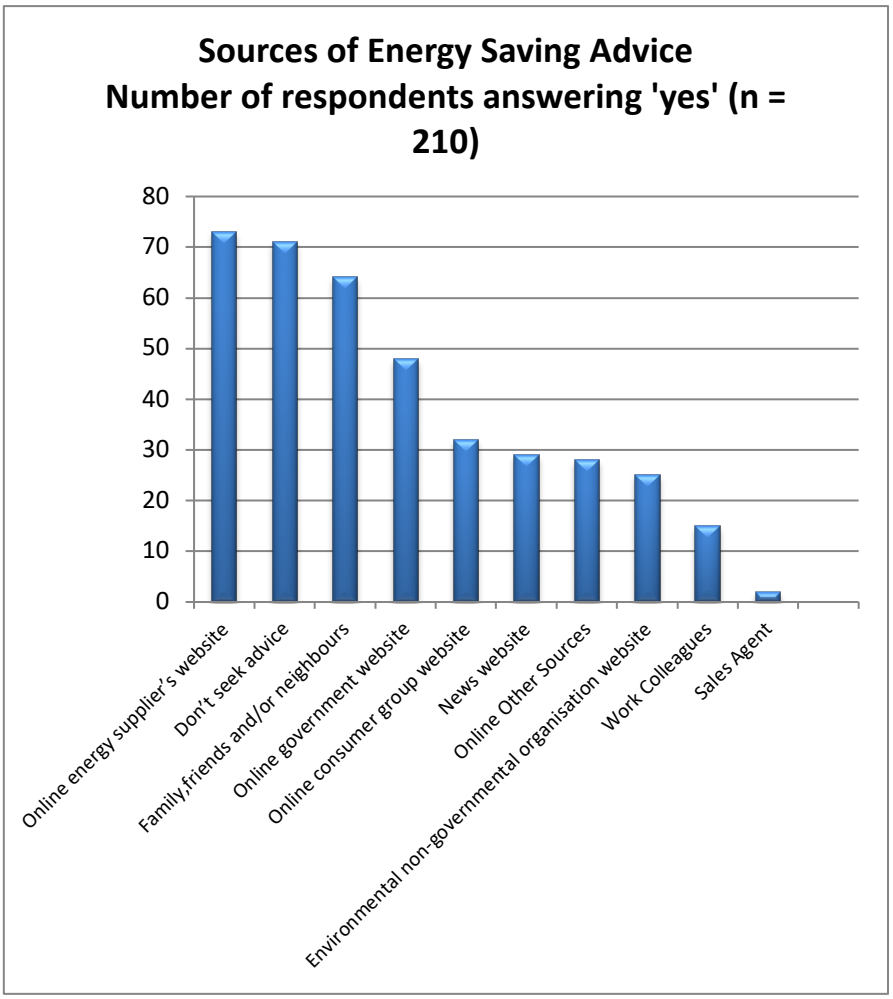

Figure 17: Sources of Energy Saving Advice

Results: Boardman and Darby (2000) and Green et al. (1998) both highlight the importance of a recipient trusting those who are providing advice if they are to subsequently act on this advice (Simcock et al., 2014) by adopting the PPMSS in this context. In order for marketers to promote the PPMSS the three most common and trustworthy sources of education for consumers, according to this study are the energy supplier's website, family/friends and or neighbours or an online government website. Interestingly, work colleagues and sales agents were found to be the least common likely sources of trustworthy energy saving advice.

Summary of Findings Pertaining to Product Factors

The most common prepaid services used were prepaid metro transit cards, prepaid gift cards and tollgate for transportation.

87.62% of the respondents sampled have a meter located outside their home, outside the building. 7.60% of the sample has a meter located outside their home in a cupboard or utility room located within their building of residence, which they do not have access to. This indicates that the meter location is not in a convenient location for consumers and promotes energy use being out of site and mind. The focus group respondents also substantiated this view as many respondents remarked that their meters are located outside of their homes and due to its location, many consumers often do not physically check the meter reading on their meters. There was not a significant effect on the meter location on willingness to adopt the PPMSS at $p < 0.050$ [$F(3,206) = 1.251$, $p = 0.292$].

74.30% of the sample does not have access to an in-home energy visual display, which indicates that many consumers are unable to effectively monitor their household energy usage as they inconveniently do not have access to a monitor display, in the home, which enables them to monitor, measure and hence manage their electricity usage. There was not a significant effect on the presence of an in-home display on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(2,207) = 0.830$, $p = 0.437$]

71.90% of the respondents sampled would prefer to adopt a prepaid solution from the energy supplier. There was not a significant effect on the availability of the PPMSS from third party providers on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(4, 205) = 0.625$, $p = 0.645$].

47.00% of respondents trust their energy provider to assist them to optimise their electricity consumption. 31.40% said no they do not trust their energy provider and a remaining 45.00 % said that they do not know. The group of consumers who trust their energy provider to inform them about actions to optimise their electricity consumption ($N = 99$) on willingness to adopt the PPMSS ($M = 2.96$,

SD = 1.384) was higher in comparison, the second group that answered no (N = 66) (M = 2.42, SD = 1.278). The mean scores between the groups are significantly different $t(163) = 2.509$, $p < 0.05$.

In order for marketers to promote the PPMSS the three most common and trustworthy sources of education for consumers, according to this study are the energy supplier's website, family/friends and or neighbours or an online government website. Interestingly, work colleagues and sales agents were found to be the least common likely sources of trustworthy energy saving advice.

DEMOGRAPHICS

The next cluster of variables is demographic factors. The first group of factors to be explored are living condition factors.

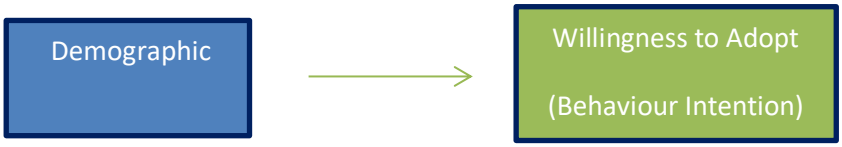

Figure 18: Demographic Factors' Impact on Willingness to Adopt the PPMSS

LIVING CONDITIONS

Primary State of Residence: The respondents will be asked what state they reside in as not all states have deregulated energy markets and consumers may use more energy in some states due to weather conditions and energy prices differ per state.

What is your primary state of residence in Australia?

- **Victoria**
- **Tasmania**
- **Queensland**
- **None of these (screening question: terminated respondents who chose this option)**

Descriptive Statistics							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
What is your primary state of residence in Australia?	210	2	1.90	.969	.938	.192	.168
Valid N (listwise)	210						

Table 84: Descriptive Statistics for Primary Place of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
	Victoria	109	51.9	51.9	51.9
	Tasmania	12	5.7	5.7	57.6
	Queensland	89	42.4	42.4	100.0
	Total	210	100.0	100.0	

Table 85: Frequency Primary Place of Residence Responses

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.944[a]	2	1.472	.850	.429	.008
Intercept	664.352	1	664.352	383.511	.000	.649
Q4 – State of Residence	2.944	2	1.472	.850	.429	.008
Error	358.584	207	1.732			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .008 (Adjusted R Squared = -.001)						

Table 86: ANOVA for Primary Place of Residence

Results: There was not a significant effect of primary state of residence in Australia on willingness to adopt the PPMSS at the p <0.050 level for the conditions tested [F (2,207) = 0.850, p = 0.429].

Status of Tenure / Length of Residency: This question will assess whether the respondent is a temporary or permanent resident that owns a house, mortgages or rents their primary place of residency. It is more likely that lower income households, younger people and single parents will be renters rather than owner-occupiers. Consequently, this stifles the opportunity and motivation to make energy friendly household improvements to support changed behaviour (Fielding et al., 2009). In contrast, owners are more likely to make the conservation of energy a priority by investing in energy efficient appliances, installing micro generation technologies and investing in other household improvements. Owners are also more likely to take action on energy advice provided(Darby, 2006b, p. 2932).

Which of the following best describes your status at your primary place of residence?

Descriptive Statistics							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Which of the following best describes your status at your primary place of residence?	210	5	1.84	1.280	1.639	1.315	.168
Valid N (listwise)	210						

Table 87: Descriptive Statistics for Status (Owner/Tenant) at Primary Place of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
	Permanent resident (own) and stayed > 6 months	139	66.2	66.2	66.2
	Permanent resident (rent from landlord or real estate agent) and stayed > 6 months	52	24.8	24.8	91.0
	Temporary resident (rent from landlord or real estate agent) and stayed < 6 months	7	3.3	3.3	94.3
	Permanent resident (rent from public housing)	9	4.3	4.3	98.6
	I prefer not to say	3	1.4	1.4	100.0
	Total	210	100.0	100.0	

Table 88: Frequency of Status at Primary Place of Residence Responses

The majority of the sample (66.20%) were permanent residents that owned their home and have stayed at the premises for more than 6 months. 24.80% were permanent resident tenants that have resided at their residence for more than 6 months. 3.30% are temporary residents who rent and have stayed at their home for less than 6 months and only 4.30% are permanent residents living in in public housing.

F2: “It would have to have a good benefit to our household to have us switch. Also the cost of investing in this would have to be beneficial. Probably wouldn’t interest us at the moment as we are renting, but maybe when we buy our home.” This shows that renters are stifled to make investments.

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10.746[a]	4	2.686	1.570	.184	.030
Intercept	370.278	1	370.278	216.393	.000	.514
Q42	10.746	4	2.686	1.570	.184	.030
Error	350.783	205	1.711			

Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .030 (Adjusted R Squared = .011)						

Table 89: ANOVA for Status at Primary Place of Residence

Result: There was not a significant effect of status at primary place of residence on willingness to adopt the PPMSS at the p <0.050 level for the conditions tested [F (4,205) = 1.570, p = 0.184].

Household Size: Household size has been used in previous studies to indicate differences in buying opportunities and household activities (Uusitalo, 1986) cited in (Tanner & Kast, 2003). The more people living in the household the more energy intensive the household is likely to be (Fritzsche, 1981; Verhallen & Van Raaij, 1981) as cited in (Van Raaij & Verhallen, 1983). The more energy intensive the household the more likely they will be to adopt the PPMSS.

How many people are living at your primary place of residence, including yourself?

Descriptive Statistics							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
How many people are living at your primary place of residence, including yourself?	210	3	1.79	.515	.265	-.048	.168
Valid N (listwise)	210						

Table 90: Descriptive Statistics for Household Size

		Frequency	Percent	Valid Percent	Cumulative Percentage
	1	54	25.7	25.7	25.7
	2-4	148	70.5	70.5	96.2
	5-7	7	3.3	3.3	99.5
	8-10	1	.5	.5	100.0
	Total	210	100.0	100.0	

Table 91: Frequency of Statistics for Household Size Responses (Part 1 – All Responses)

Hypothesis: The larger the household the more likely the adoption of the PPMSS

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.542[a]	3	.181	.103	.958	.001
Intercept	105.841	1	105.841	60.399	.000	.227
Q43	.542	3	.181	.103	.958	.001
Error	360.987	206	1.752			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .001 (Adjusted R Squared = -.013)						

Table 92: ANOVA for Household Size

Result: There was not a significant effect of household size on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(3,206) = 0.103$, $p = 0.958$].

The researcher then ran an analysis on two groups (household size of < = 4 and > 4). The descriptive statistics are below.

Group Statistics					
	Household Size	N	Mean	Std. Deviation	Std. Error Mean
Willingness to Adopt Prepaid Solution	1.00 (< = 4)	202	2.73	1.312	.092
	2.00 (> 4)	8	2.75	1.488	.526

Table 93: Descriptive Statistics for Household Size (Part 2 – Two Groups)

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Willingness to Adopt Prepaid Solution	Equal variances assumed	.201	.654	-.047	208	.963	-.022	.475	-.959	.915
	Equal variances not assumed			-.042	7.437	.968	-.022	.534	-1.270	1.226

Table 94: T Test for Household Size (2 Groups Only)

Result: The group with a household size of less than or equal to 4 (N = 202) on willingness to adopt the PPMSS (M = 2.73. SD = 1.312). In comparison, those who have a household of greater than four people (N = 8) was associated with a similar level of willingness to adopt the PPMSS (M = 2.75. SD = 1.488).

As p = 0.654 is higher than 0.05 we can conclude that the variances are equal. The mean scores between the groups are not significantly different t (208) = -0.047, p > 0.05.

Family Life Cycle Status: This will determine where the respondent is in their family life cycle. Evidence suggests that households with dependent children and working parents juggle increasingly difficult schedules that are likely to impact on overall residential energy use (Edwards & Pocock, 2011). In addition to this, energy use tends to fluctuate over the family life-cycle. Younger partners without children with both partners working outside the home tend to have a low level of energy use. Households with children at home will have a higher level of energy use and households whose children have left home will have decreased energy use. However, energy use gradually increases with age as older persons need higher temperatures (Van Raaij & Verhallen, 1983). Family life cycle stages that are attributed to greater energy use are more likely to adopt the PPMSS.

What is your current family life cycle status?

Descriptive Statistics							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
What is your current family life cycle status?	210	8	5.67	2.288	5.236	-.383	.168
Valid N (listwise)	210						

Table 95: Descripive Statistics for Family Life Cycle

		Frequency	Percent	Valid Percent	Cumulative Percent
	Bachelor stage - young, single not living at home	11	5.2	5.2	5.2
	Newly married couple or couple in committed relationship - young, no children	17	8.1	8.1	13.3
	Full nest I - young couple (married or committed relationship) or single parent with youngest child under six	9	4.3	4.3	17.6
	Full nest II - young/older couple (married or committed relationship) or single parent with youngest child under eighteen years old	25	11.9	11.9	29.5
	Full nest III - older couple (married or committed relationship) or single parent with independent children living with them	31	14.8	14.8	44.3
	Empty nest I - older working couple (married or committed relationship) or single parent with no children living with them	28	13.3	13.3	57.6
	Empty nest II - older couples (married or committed relationship), retired, no children living at home	41	19.5	19.5	77.1
	Solitary survivor - in labour force	23	11.0	11.0	88.1
	Solitary survivor – retired	25	11.9	11.9	100.0
	Total	210	100.0	100.0	

Table 96: Frequency of Family Lifeycle Status Responses

19.50% of the respondents were older couples (married or committed relationship), retired with no children living at home. 14.80% of the sampled respondents were older couples (married or committed relationship) or single parent with independent children living with them.

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	20.088[a]	8	2.511	1.478	.167	.056
Intercept	1371.903	1	1371.903	807.615	.000	.801
Q44	20.088	8	2.511	1.478	.167	.056
Error	341.440	201	1.699			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .056 (Adjusted R Squared = .018)						

Table 97: ANOVA for Family Life Cycle Stage

Result: There was not a significant effect of current family life cycle on willingness to adopt the PPMSS at $p < 0.050$ [$F(8,201) = 1.478$, $p = 0.167$].

The researcher next explored if electricity bills were affected by family life cycle.

Descriptives			
How much was your electricity bill for the last quarter at your primary place of residence?			
What is your current family life cycle status?	Mean	N	Std. Deviation
Bachelor stage - young, single not living at home	4.18	11	1.537
Newly married couple or couple in commited relationship - young, no children	4.65	17	1.869
Full nest I - young couple (married or committed relationship) or single parent with youngest child under six	5.11	9	1.364
Full nest II - young/older couple (married or committed relationship) or single parent	5.44	25	2.382

with youngest child under eighteen years old			
Full nest III - older couple (married or committed relationship) or single parent with independent children living with them	5.97	31	2.137
Empty nest I - older working couple (married or committed relationship) or single parent with no children living with them	4.86	28	1.995
Empty nest II - older couples (married or committed relationship), retired, no children living at home	4.49	41	1.381
Solitary survivor - in labour force	4.00	23	1.348
Solitary survivor – retired	4.76	25	1.964
Total	4.87	210	1.906

Table 98: Descriptive Statistics for Family Life Cycle Stage and Electricity Bill

ANOVA					
How much was your electricity bill for the last quarter at your primary place of residence?					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	75.761	8	9.470	2.784	.006
Within Groups	683.768	201	3.402		
Total	759.529	209			

Table 99: ANOVA for Family Life Cycle Stage and Electricity Bill

Result: There was a significant effect of current family life cycle on the electricity bill level for the last quarter at the $p < 0.050$ level for the conditions tested [$F(8,201) = 2.784$, $p = 0.006$]. Those who are in the lifecycle stage Full Nest III i.e. older couple (married or committed relationship) or single parent with independent children living with them indicated that they are the highest users of energy.

PERSONAL PROFILE

Age: This question will be asked to assess which age groups of the Australian population are likely to be more energy conscious. Previous studies have found that the elderly are likely to be more aware and/or frugal (Pyrko & Darby, 2010). A screening question was included to remove subjects under the age of 18.

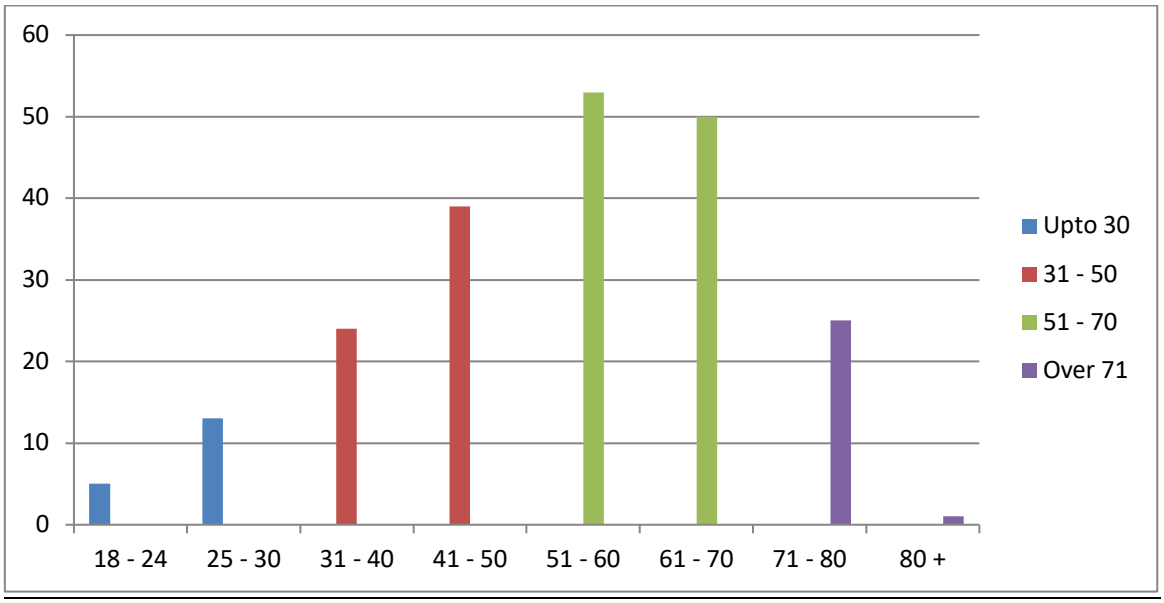

Figure 19: Age Distribution of Respondents

The majority of the sample was from 51 - 60 years old, then 61 - 70 years old and then 41 - 50 years old.

Willingness to Adopt Prepaid Solution			
What is your age?	Mean	N	Std. Deviation
18-24	3.00	5	1.225
25-30	3.23	13	1.013
31-40	3.63	24	1.279
41-50	2.87	39	1.341
51-60	2.40	53	1.182
61-70	2.58	50	1.357
71-80	2.28	25	1.242
80 +	4.00	1	.
Total	2.73	210	1.315

Table 100: Descriptive Statistics for Age and Willingnes to Adopt the PPMSS

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	37.338[a]	7	5.334	3.324	.002	.103
Intercept	404.204	1	404.204	251.855	.000	.555
Q3 - Age	37.338	7	5.334	3.324	.002	.103
Error	324.191	202	1.605			

Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .103 (Adjusted R Squared = .072)						

Table 101: ANOVA for Age and Willingness to Adopt the PPMSS

Result: There was a significant effect of age on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(7,202) = 3.324$, $p = 0.002$]. This indicates that 31 – 40 year olds would be the most willing to adopt the PPMSS

Gender: "Women usually have less extensive environmental knowledge than men but they are more emotionally engaged, show more concern about environmental destruction and are more willing to change." (Fliegenschnee & Schelakovsky, 1998) (Lehmann, 1999) cited in (Kollmuss & Agyeman, 2002, p. 248). Therefore, females are more likely to adopt the PPMSS.

Group Statistics					
	What is your gender?	N	Mean	Std. Deviation	Std. Error Mean
Willingness to Adopt Prepaid Solution	Male	105	2.56	1.315	.128
	Female	105	2.90	1.300	.127

Table 102: Descriptive Statistics for Gender and Willingness Adopt the PPMSS

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Willingness to Adopt Prepaid Solution	Equal variances assumed	.463	.497	-1.847	208	.066	-.333	.180	-.689	.022

	Equal variances not assumed			-1.847	207.974	.066	-.333	.180	-.689	.022

Table 103: T Test for Gender

Result: The group of males (N = 105) was associated with willingness to adopt the PPMSS (M = 2.56, SD = 1.315). In comparison, females (N = 105) was associated with a similar level of willingness to adopt the PPMSS (M = 2.90, SD = 1.300).

As p = 0.497 is higher than 0.05 we can conclude that the variances are equal. The mean scores between the groups (male and female) are marginally significant, t (208) = - 1.847, p > 0.05.

EDUCATION AND EMPLOYMENT

Highest Level of Educational Attainment: This will assess if education is related to intentions to purchase PPMSS. It has been found that extensive environmental knowledge increases with years of education(Kollmuss & Agyeman, 2002, p. 248). However, more education does not necessarily translate into pro-environmental behaviour.

What is your highest level of educational attainment?

Categories							
	N	Range	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
What is your highest level of educational attainment?	210	4	2.96	1.177	1.386	.145	.168
Valid N (listwise)	210						

Table 104: Descriptive Statistics for Highest Level of Educational Attainment (All Groups)

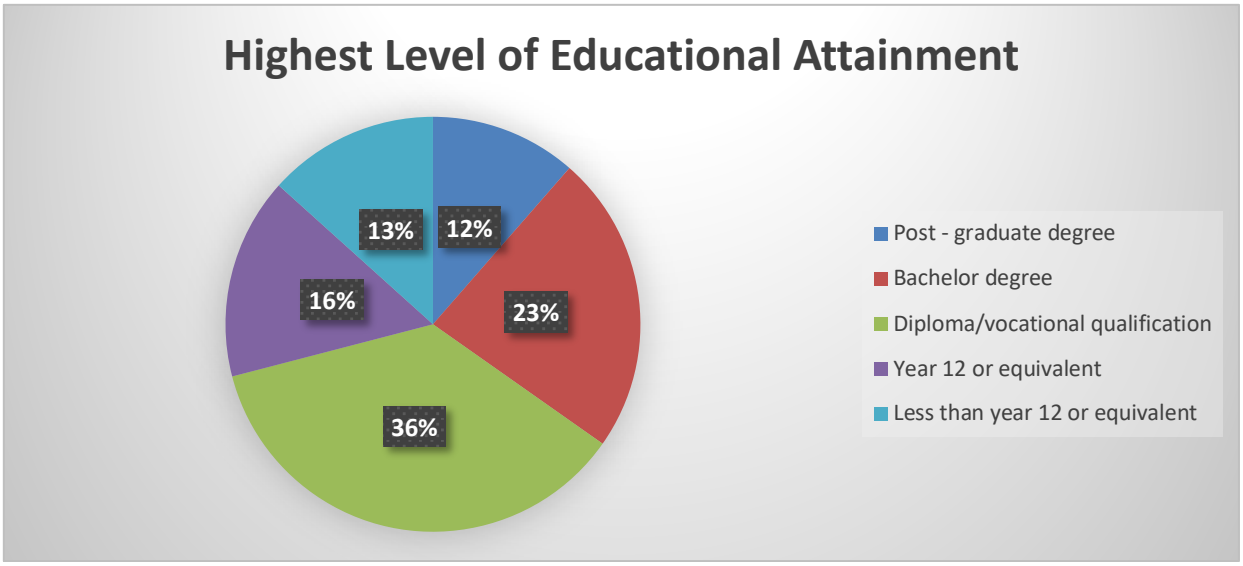

Figure 20: Highest Level of Educational Attainment of Respondents

Tests of Between-Subjects Effects						
Dependent Variable: Willingness to Adopt Prepaid Solution						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3.275[a]	4	.819	.469	.759	.009
Intercept	1320.578	1	1320.578	755.662	.000	.787
Q45	3.275	4	.819	.469	.759	.009
Error	358.254	205	1.748			
Total	1925.000	210				
Corrected Total	361.529	209				
a. R Squared = .009 (Adjusted R Squared = -.010)						

Table 105: ANOVA for Highest Level of Educational Attainment

Result: There was not a significant effect of level of educational attainment on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(4,205) = 0.469$, $p = 0.759$].

The researcher then ran a two-group comparison to see if there was a difference between those that had a university degree versus those that did not have a university degree.

Group Statistics					
	Education	N	Mean	Std. Deviation	Std. Error Mean
Willingness to Adopt Prepaid Solution	1.00 (University Degree)	73	2.78	1.357	.159
	2.00 (No University Degree)	137	2.70	1.297	.111

Table 106: Descriptive Statistics for Highest Level of Educational Attainment (2 Groups)

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Willingness to Adopt Prepaid Solution	Equal variances assumed	.203	.653	.419	208	.675	.080	.191	-.296	.457
	Equal variances not assumed			.414	141.444	.680	.080	.194	-.303	.463

Table 107: T Test for Highest Level of Educational Attainment (2 Groups)

Result: The group with those who have a university degree (N = 73) was associated with willingness to adopt the PPMSS (M = 2.78, SD = 1.357). In comparison, those who do not have a university degree (N = 137) was associated with a similar level of willingness to adop the PPMSS (M = 2.70, SD = 1.297).

As can be seem in the above table, 0.653 is higher than 0.05 so we can conclude that the variances are equal according to Levene's test. We can conclude that the mean scores between the groups are not significantly different t (208) = 0.419, p > 0.05.

Employment Status: This will assess whether the respondent is in paid employment (full-time >= 35 hours or part-time <= 34 hours), paid self-employment (full-time >= 35 hours or part-time <= 34 hours), not in paid employment or retired. According to a study many Australians report increased work hours and more than one in five Australians work more than 48 hours per week. Consequently, this means that Australians are increasingly time poor and more likely to prioritise comfort over sustainable living (Edwards & Pocock, 2011)

cited in (Chapman, 2011, p. 2).The greater the hours worked per week the less likely the adoption of the PPMSS.

What is your current work status usually?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Paid employment (full-time > = 45 hours)	20	9.5	9.5	9.5
	Paid employment (full-time 35 - 44 hours)	34	16.2	16.2	25.7
	Paid employment (part-time < = 34 hours)	37	17.6	17.6	43.3
	Paid self-employment (full-time > = 45 hours)	2	1.0	1.0	44.3
	Paid self-employment (full-time 35 - 44 hours)	2	1.0	1.0	45.2
	Paid self-employment (part -time < = 34 hours)	13	6.2	6.2	51.4
	Not in paid employment	37	17.6	17.6	69.0
	Retired	65	31.0	31.0	100.0
	Total	210	100.0	100.0	

Surveys participants were regrouped into one of three categories for analysis purposes, those who work

> = 45 hours in paid employment, those who work < = 44 hours in paid employment and those who are not in paid employment or retired.

Hypothesis: Those who work greater hours per week are less likely to adopt the PPMSS.

Willingness to Adopt Prepaid Solution			
Employed New	Mean	N	Std. Deviation
1.00 > = 45 hrs	3.00	22	1.309
2.00 <= 44 hrs	2.85	86	1.351
3.00 0 Not in paid or retired	2.57	102	1.278
Total	2.73	210	1.315

Table 108: Descriptives for Employment Status (3 Groups)

ANOVA Table							
			Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
*Willingness to Adopt Prepaid Solution * Employed New*	*Between Groups*	*(Combined)*	*5.474*	*2*	*2.737*	*1.591*	*.206*
	Within Groups		*356.054*	*207*	*1.720*		
	Total		*361.529*	*209*			

Table 109: ANOVA for Employment Status (3 Groups)

Result: There was not a significant effect of hours worked on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(2,207) = 1.591$, $p = 0.206$.

Annual Household Gross Income Before Tax: This will assess what the respondent's annual household gross income. (Brandon & Lewis, 1999) found that higher income is correlated to higher energy consumption and higher environmental awareness (McKerracher & Torriti, 2012). In addition to this, higher income strongly impacts the investment behaviour of households with regards to home insulation and solar energy. Therefore, higher-income consumers are more likely to adopt the PPMSS.

If you are currently in paid employment or paid self-employment, then what is the total current gross household income level per year before tax?

Descriptive Statistics						
	N	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Household Gross Income Level Before Tax	210	4.99	2.446	5.981	.229	.168
Valid N (listwise)	210					

Table 110: Descriptive Statistics for Household Gross Income Level (Before Tax)

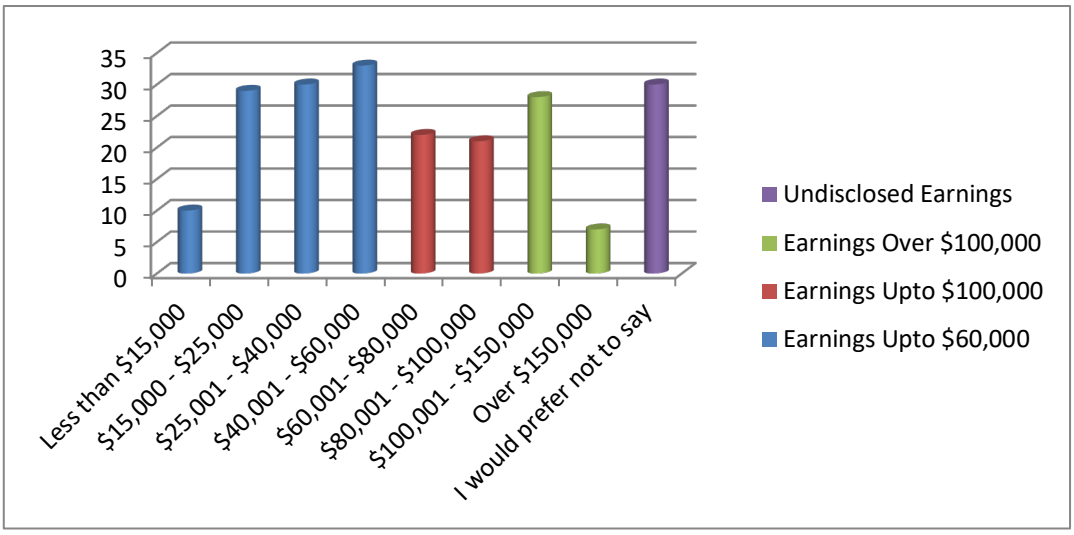

Figure 21: Gross Household Income of Respondents

Tests of Between-Subjects Effects

Dependent Variable: Willingness to Adopt Prepaid Solution

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.568[a]	8	1.571	.905	.513	.035
Intercept	1224.986	1	1224.986	705.588	.000	.778
Q47	12.568	8	1.571	.905	.513	.035
Error	348.960	201	1.736			
Total	1925.000	210				
Corrected Total	361.529	209				

a. R Squared = .035 (Adjusted R Squared = -.004)

Table 111: ANOVA for Household Gross Income Level (Before Tax)

Result: There was not a significant effect of level of annual gross household income on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(8,201) = 0.905$, $p = 0.513$].

The researcher then re ran the test on the following two groups:

Group Statistics					
	Income	N	Mean	Std. Deviation	Std. Error Mean
Willingness to Adopt Prepaid Solution	1.00 < = $60000	102	2.60	1.352	.134
	2.00 > $60000	78	2.83	1.343	.152

Table 112: Descriptive Statistics for Gross Household Income (Before Tax) (2 Groups)

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Willingness to Adopt Prepaid Solution	Equal variances assumed	.108	.743	-1.161	178	.247	-.235	.203	-.635	.165
	Equal variances not assumed			-1.162	166.394	.247	-.235	.203	-.635	.165

Table 113: T Test for Gross Household Income (Before Tax) (2 Groups)

Result:

The group with those who have income less than or equal to $60,000 (N = 102) was associated with willingness to adopt the PPMSS (M = 2.60, SD = 1.352). In comparison, those who have an income of greater than $60,000 (N = 78) was associated with a similar level of willingness to adopt the PPMSS (M = 2.83, SD = 1.343).

As 0.743 is higher than 0.05 we can conclude that the variances are equal. The mean scores between the groups are not significantly different t (178) = -1.161, $p > 0.05$.

Summary of Findings Pertaining to Demographic Factors

An analysis of the demographic factors tested indicated the following:

- There was not a significant effect of primary state of residence in Australia on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(2,207) = 0.850$, $p = 0.429$].
- The majority of the sample (66.20%) were permanent residents that owned their home and have stayed at the premises for more than 6 months. There was not a significant effect of status at primary place of residence on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(4,205) = 1.570$, $p = 0.184$].
- There was no significant effect due to household size.
- There was not a significant effect of current family life cycle on willingness to adopt the PPMSS at $p < 0.050$ [$F(8,201) = 1.478$, $p = 0.167$]. There was a significant effect of current family life cycle on the electricity bill level for the last quarter at the $p < 0.050$ level for the conditions tested [$F(8,201) = 2.784$, $p = 0.006$]. Those who are in the lifecycle stage Full Nest III i.e. older couple (married or committed relationship) or single parent with independent children living with them indicated that they are the highest users of energy, however this does not indicate willingness to adopt the PPMSS.
- The majority of the sample was from 51 - 60 years old, then 61 - 70 years old and then 41 - 50 years old. There was a significant effect of age on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(7,202) = 3.324$, $p = 0.002$]. This indicates that 31 – 40 year olds would be the most willing to adopt the PPMSS
- The group of males (N = 105) was associated with willingness to adopt the PPMSS ($M = 2.56$, $SD = 1.315$). In comparison, females (N = 105) was associated with a similar level of willingness to adopt the PPMSS ($M = 2.90$, $SD = 1.300$). The mean scores between the groups (male and female) are marginally significantly different $t(208) = -1.847$, $p > 0.05$.

- There was not a significant effect of level of educational attainment on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(4,205) = 0.469$, $p = 0.759$]. The researcher then ran a two-group comparison to see if there was a difference between those that had a university degree versus those that did not have a university degree. The mean scores between the groups are not significantly different $t(208) = 0.419$, $p > 0.05$.
- There was not a significant effect of hours worked on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(2,207) = 1.591$, $p = 0.206$.
- There was not a significant effect of level of annual gross household income on willingness to adopt the PPMSS at the $p < 0.050$ level for the conditions tested [$F(8,201) = 0.905$, $p = 0.513$]. The group with those who have income less than or equal to $60,000 ($N = 102$) was associated with willingness to adopt the PPMSS ($M = 2.60$, $SD = 1.352$). In comparison, those who have an income of greater than $60,000 ($N = 78$) was associated with a similar level of willingness to adopt the PPMSS ($M = 2.83$, $SD = 1.343$). The mean scores between the groups are not significantly different $t(178) = -1.161$, $p > 0.05$.

Willingness to Adopt Prepaid Solution				
	Frequency	Percent	Valid Percent	Cumulative Percent
Definitely will not be willing	51	24.3	24.3	24.3
Probably will not be willing	45	21.4	21.4	45.7
Don't Know	43	20.5	20.5	66.2
Probably will be willing	52	24.8	24.8	91.0
Definitely would be willing	19	9.0	9.0	100.0
Total	210	100.0	100.0	

Table 114: Frequency for Willingness to Adopt the PPMSS Response

Overall, this study indicates that prepayment is infact ripening as a service option in Australia and it should be a choice available to energy consumers despite their age, income, gender or educational status. As M2 from the focus group states, “[w]e should all be given the option of prepaid at the very least!” As can be seen

by the table above, this study found that 24.8% of the respondents probably would be willing to adopt the prepaid solution and 9% definitely would be willing. 20.5% indicated that they do not know, which emphasizes further education is required for consumers to understand the difference between the traditional and prepaid service options.

The researcher next examines some multi-variate regressions to gain further insights.

Further Analysis

Multi Collinearity Testing of Consumer Psychology Factors

The consumer psychology factors were tested for multi-collinearity using an iterative process. Multicollinearity is a potential problem that is tested because it can cause an increase in the variance of the regression coefficients, making them unstable and difficult to interpret. The following consumer psychology factors were all tested: Environmental consciousness, happiness, anger, fear, guilt, current energy curbing behaviours, bill auditing behaviours, replacement of energy appliances before they break, investment in solar panels, direct feedback, expectation of others' cooperation and perceived efficacy. In all rounds of iterations, anger and fear had a VIF of greater than 3 when measured against each variable, but they were both just on the cusp of 3. This indicates a moderate indication of multi-collinearity.

As the VIF has not reached the threshold of > 5 we can conclude that there is not a collinearity problem amongst the consumer psychology factors (scales) tested in this model. There are studies that suggest an even higher threshold of 10, but the researcher has used a conservative threshold.

Multi-Variate Regression Analysis

Multi-variate regressions were run on the significant consumer psychology factors to gain more insight.

Direct Feedback, Environmental Consciousness and Expectation of Others' Cooperation, Happiness, Anger, Guilt and Fear on Willingness to Adopt

A standard multiple regression was performed to predict willingness to adopt from direct feedback, environmental consciousness, expectation of others' cooperation, happiness, anger, guilt and fear variables.

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.493[a]	.243	.216	1.164	.243	9.243	7	202	.000	1.682
a. Predictors: (Constant), To what extent do you agree or disagree with the following statements:-Most household consumers are willing to make sacrifices to conserve energy, When you think of the way humans are altering the environment how do you feel?-Happy, NEW VARIABLE: (Q37_1 + Q37_2 + Q37_3 + Q37_4 + Q37_5 + Q37_6 + Q37_7 + Q37_8 + Q37_9 + Q37_10 + Q37_11 + Q37_12) / 12), When you think of the way humans are altering the environment how do you feel?-Guilty, NEW VARIABLE: (Q7_1+Q7_2+Q7_3+Q7_4) / 4., When you think of the way humans are altering the environment how do you feel?-Fearful, When you think of the way humans are altering the environment how do you feel?-Angry										
b. Dependent Variable: Willingness to Adopt Prepaid Solution										

Table 115: Model Summary for Multivariate Regression on Significant Factors

The Durbin Watson test indicates that d = 1.682, which is between the two critical values of 1.5 to 2.5.

The adjusted R Square measures the proportion of the total variability in the dependent variable that are explained by the independent variables in the model. 21.6% of the total variability in willingness to adopt is explained by direct feedback, expectation of others' cooperation and environmental consciousness, happiness, anger, fear and guilt.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	87.706	7	12.529	9.243	.000[b]
	Residual	273.823	202	1.356		
	Total	361.529	209			
a. Dependent Variable: Willingness to Adopt Prepaid Solution						
b. Predictors: (Constant), To what extent do you agree or disagree with the following statements:-Most household consumers are willing to make sacrifices to conserve energy, When you think of the way humans are altering the environment how do you feel?-Happy, NEW VARIABLE: (Q37_1 + Q37_2 + Q37_3 + Q37_4 + Q37_5 + Q37_6 + Q37_7 + Q37_8 + Q37_9 + Q37_10 + Q37_11 + Q37_12) / 12), When you think of the way humans are altering the environment how do you feel?-Guilty, NEW VARIABLE: (Q7_1+Q7_2+Q7_3+Q7_4) / 4., When you think of the way humans are altering the environment how do you feel?-Fearful, When you think of the way humans are altering the environment how do you feel?-Angry						

Table 116: ANOVA for Multivariate Regression Significant Factors

F (7, 202) = 9.243, p < 0.05. Therefore, there is strong evidence to reject the null that the model has no explanatory power. This means that the model does have explanatory power and we can proceed to examine the coefficients below.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.175	.600		1.956	.052
	NEW VARIABLE: (Q7_1+Q7_2+Q7_3+Q7_4) / 4.	-.084	.096	-.076	-.883	.378
	NEW VARIABLE: (Q37_1 + Q37_2 + Q37_3 + Q37_4 + Q37_5 + Q37_6 + Q37_7 + Q37_8 + Q37_9 + Q37_10 + Q37_11 + Q37_12) / 12)	.466	.072	.432	6.446	**.000**
	When you think of the way humans are altering the environment how do you feel? -Happy	-.266	.114	-.159	-2.344	**.020**
	When you think of the way humans are altering the environment how do you feel? -Guilty	.204	.106	.156	1.927	.055
	When you think of the way humans are altering the environment how do you feel? -Angry	.005	.144	.004	.037	.971
	When you think of the way humans are altering the environment how do you feel? -Fearful	-.148	.137	-.118	-1.082	.280
	To what extent do you agree or disagree with the following statements: -Most household consumers are willing to make sacrifices to conserve energy	.076	.092	.052	.829	.408

a. Dependent Variable: Willingness to Adopt Prepaid Solution

Table 117: Multivariate Regression Output for Significant Factors

Willingness to Adopt PPMSS = 1.175 - (0.084 x Environmental Consciousness)+(0.466 x Direct Feedback) – (0.266 x Happiness) + (0.204 x Guilt) + (0.005 x Anger) + (0.148 x Fear) + (0.076 x Expectation of Others' Cooperation)

The regression model revealed that only two of the variables in the model are significant, direct feedback and happiness. Thus:

The unstandardized coefficient is equal to 0.466 for direct feedback. This means that for one unit increase in direct feedback, there is an increase of 0.466 for willingness to adopt, holding all other variables equal.

The unstandardized coefficient is equal to 0.266 for happiness. This means that for one unit increase in happiness, there is an increase of 0.266 for willingness to adopt, holding all other variables equal.

Chapter Seven: Key Summary of Qualitative and Quantitative Findings

Environmental sustainability has become a prevailing topic due to the increased public interest of climate change (Garnaut, 2008). This research contributes to the emerging field of "Sustainable HCI"(DiSalvo & Brynjarsdóttir, 2010) which is defined as research at the intersection of people, technology and environmental concerns (Petkov et al., 2011, p. 2). In this context, the PPMSS is promising technology (Fogg, 2003) that enables and motivates energy consumers to live and act in a more sustainable pro-environmental manner (Petkov et al., 2011, p. 2) whether they intentionally choose to or not. This research project uses a mixed-method approach to explore whether a prepaid smart metering electricity solution is ripening as a service option for Australian consumers throughout the demographic spectrum. Evidence suggests that prepaid utility metering leads to a reduction in energy use hence cost savings. What is unclear is whether willingness to adopt this solution is primarily driven by pro-environmental consciousness or a host of other consumer psychology, financial, product or demographic factors? Therefore, this study aimed to answer this question by researching: "What factors influence consumers' willingness to adopt a pre-paid utility solution over the traditional post-paid utility billing model?"

Chapter seven will summarise the qualitative and quantitative findings.

Key Summary of Qualitative Findings:

The qualitative findings indicated that:

- Consumers do not necessarily change their habits after receiving an energy bill as many have learnt to expect a high, confusing and abstract bill, which shows total usage, rather than broken down usage. The graphical comparative averages assist them to benchmark how they are doing in comparison to social norms in the area. However, the quarterly

billing cycle means that the adjustment of energy usage can be too late and backward looking.

- Consumers rarely or never check the reading on the main meters provided by energy retailers. Many consumers do not even know where their meter is located! In addition to this, checking the meter can be an impossible task for residents who live in Body Corporate environments where the meter is not easily accessible and locked away in a utility cupboard.
- Consumers felt that they do not have control in the post-paid billing system. A more regular billing cycle will empower consumers to feel more in control. The bar graphs on the bill (historical data) helps consumers control and gauge their usage. This indicates a thirst for feedback data.
- There seems to be a consensus amongst respondents that energy prices are increasing and some consumers have desensitised themselves to expect high bills as the norm and as such some do not experience 'bill shock'. The installation of solar panels has acted as a 'Band-Aid' for bill shock and some consumers look forward to receiving their bill to see what credit will apply.
- Consumers expect a higher bill due to the use of heating in Winter months.
- Many consumers are uncertain as to whether they are being charged based on actual or estimated usage. Some respondents mentioned that they do not see someone checking their meter.
- Not all consumers have a clear understanding of their current tariff structure.
- Some consumers find the comparison of tariff structures confusing and cannot accurately ascertain which option is best for them. Most consumers seemed to opt for a fixed rate (perhaps due to the simplicity of this tariff structure).

- Most consumers do not have access to an in-home display which tells them how much they are using live or give them access to an online portal to view their transaction history online.
- Many consumers have used prepaid services before in other industries and have enjoyed using them for example: prepaid MYER, iTunes and massage gift cards, prepaid mobile phones, gym memberships, petrol, groceries, take-a-way food, transportation (bus and train tickets), online shopping, visa application, cash buyer of a car, lawyers who make you put money in a trust account upfront.
- Prepayment is often a premium service and as such this can dissuade consumers to use these products, such as phone plans.
- F10 stated that when purchasing prepaid goods or services, it "depends on what it is for, you might not use it until long time down the track. If you are going to use it straight away and regularly then it's good but if you are going to use it down the track, then you are out of pocket and then you might not even use it!" Therefore, essentials such as groceries, fuel and utilities would be used straight away and as such would suit the prepaid option.
- Consumers are somewhat aware of smart meters but aren't entirely sure what makes them 'smart'. M7 mentioned, "I have heard of them but don't know the full description. They have more efficient technology to more accurately measure your energy consumption." Furthermore, M11 states, "I guess they might be electronic devices that measure energy consumption and are complemented with an online/mobile service presenting up-to-date energy use information and facilitating credit prepayment. Possibly smart meters could include extra information on use per device or environmental impacts."
- Consumers would be willing to adopt the prepaid billing solution if it is proven to be cheaper and save the consumer in the long run, if there are no lock-in contracts and bills, if it helps consumers manage their electricity usage and feel more in control, if there is integration to online

platforms and mobile devices and it helps them make sure that their bill from the Energy Retailer is accurate.

- Tenants are stifled to implement energy efficient home improvement investments, even if they desire to.
- Some respondents are aware of prepaid meters in foreign regions. F5 remembered using a prepaid system in England, "… a coin operated one…..when I was younger. This was for a gas meter I remember I would top it up to make sure we were not in the cold when it snowed. These days there are magnetic card and token operated systems so they are more sophisticated. I came across many of them in my travels to South Africa and Bali too." In addition to this, M10 mentioned that he has seen them in New Zealand and F11 mentioned that she has a prepaid meter which has electricity provided by the management in a site on the Gold Coast (Australia).
- The respondents seemed to recognise the benefits and features of prepayment meters (which are not always inherent in the traditional postpaid billing system). As M2 states, "[w]e should all be given the option of prepaid at the very least!"
- There are mixed opinions whether consumers would be willing to adopt a prepaid solution at a premium. Those that desire the additional features and understand the behaviour change savings features may be willing to pay more for this option. As F8 mentioned, "I would be willing to pay 10% more on the tariff for the additional features in option 2 because I know if I can see how much I use I would definitely react and sacrifice my usage." F8 created a powerful analogy e.g. *"This is your lungs (monitor). Every time you smoke (use energy) they will get darker and darker… I would change my behaviour because I know I am harming myself."* Humans need to see that they are visually harming themselves, the environment or their hip pocket for them to be driven to make change. This could be a powerful campaign used to educate consumers on the importance of energy conservation management, through direct feedback, which is enabled through the adoption of prepayment smart

meters. In addition to this, M11 mentioned “I would consider prepaid if it would give me a lot of control and flexibility (e.g. no lock-in contract) at a comparable (only slightly higher) price.”

Key Summary of Quantitative Regression Findings

The table below is a summary of the regression results for consumer psychology and financial factors.

Bivariate Regression Results

Independent Variables	t Statistic	Beta Standardized	Significance	Adjusted R Squared	Adjusted R	Effect Size
Environmental Consciousness	2.016	0.138	0.045	0.014	**0.118**	Small
Happiness	-2.613	-0.178	0.010	0.027	**0.164**	Small
Anger	2.430	0.166	0.016	0.023	**0.152**	Small
Fear	1.985	0.136	0.048	0.014	**0.118**	Small
Guilt	3.685	0.248	0.000	0.057	**0.239**	Small to Medium
Current Energy Curbing Behaviours	0.086	0.006	0.931	0.005	**0.071**	
Bill Auditing Energy Curbing Behaviours	1.670	0.115	0.096	0.008	**0.089**	
Replacement of Energy Efficient Appliances Before they Break	-1.152	-0.08	0.251	0.002	**0.045**	
Investment in Solar Panels	-0.837	-0.058	0.404	0.001	**0.032**	
Direct Feedback	7.246	0.449	0.000	0.198	**0.445**	Medium to Large
Expectation of Others' Cooperation	2.139	0.147	0.034	0.017	**0.130**	Small
Perceived Efficacy	-1.265	-0.087	0.207	0.003	**0.055**	
Concern About Paying Bill	1.232	0.085	0.219	0.002	**0.045**	
Financial Locus of Control	-1.155	-0.080	0.249	0.002	**0.045**	
Putting Off Other Household Expenditures to Pay Energy Bill	1.004	0.069	0.316	0.000	**0.000**	

KEY:

Consumer Psychology Factors

Financial Factors

Table 118: Summary of Regression Results

Effect Size	R
Small	0.10
Medium	0.30
Large	0.50

Table 119: Effect Size Rule of Thumb Adopted

The above effect size rules of thumb have been adopted from Cohen's work (Cohen, 1988).

Driving Consumer Psychology Factors:

As can be seen below environmental consciousness, emotional involvement such as happiness, anger, fear and guilt, direct feedback and expectation of others' cooperation were all significant factors.

Environmental Consciousness

Consumers who are more concerned about the environment, tend to have more pro-environmental beliefs and also are aware of environmental issues will be more 'environmentaly conscious' and ultimately more willing to engage in pro-environmental behaviour.

Emotional Involvement i.e. Sadness (opposite of happiness), Anger, Fear and Guilt

The bivariate results indicated that there was a significant relationship when respondents are emotionally involved in the way that humans are altering the environment and this has a significant relationship on their willingness to adopt the PPMSS. The feelings of anger, fear and guilt had a positive significant relationship and the feeling of happiness had a negative significant. These results do not substantiate the literature which has shown that fear, sadness and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). In contrast, this study shows that the feeling of guilt is the most likely to trigger pro-environmental behaviour over the other emotions. In addition

to this, these results indicate that negative feelings have a positive effect on pro-environmental behaviours and that happy feelings have the reverse effect.

Direct Feedback

The bivariate results indicated that the desirability of direct feedback through certain features inherent in the PPMSS has a significant impact ($p = 0.001$, $t = 7.246$, $\beta = 0.485$, $r = 0.445$ (medium to large effect size)) on their willingness to adopt the PPMSS. This is as expected because these features are directly attributed to the product (the PPMSS) and are often not available in the existing traditional post-paid scenario. If consumers desire to utilise and have access to these novel features, then this will instigate adoption. This is consistent with Fietkau and Kessel (1981)'s model which emphasized that attitudes need to be product specific in order to have any impact on pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Expectation of Others' Cooperation: Consumers are often strongly affected by social norms and by their expectation of what others will do. If consumers expect others to engage in energy conservation behaviour and make sacrifices consumers are likely to imitate this and will be more willing to adopt the technology, which in this context is the PPMSS (Gupta & Ogden, 2009). The results indicated that the expectation of others' cooperation (i.e. the belief that most other household consumers are willing to make sacrifices to conserve energy) had a significant on the willingness to adopt the PPMSS.

Multi-Variate Regression

The multi-variate regression indicated that happiness and direct feedback were the significant variables when all significant consumer psychology factors were run in the multi-variate regression model.

Non-Influential Consumer Psychology Factors:

In contrast, engagement in current energy curbing behaviours, engagement in bill auditing energy curbing behaviours, the replacement of energy efficient appliance before they break, investment in solar panels and perceived efficacy were all found to not be significant.

Current Energy Curbing Behaviours

Although consumers may engage in current energy curbing behaviours this does not have a significant impact on their willingness to adopt the PPMSS.

Bill Auditing Energy Curbing Behaviours

The bivariate results indicated that although consumers may engage in current bill auditing energy curbing behaviours this does not have a significant on their willingness to adopt the PPMSS. Even though bill auditing energy curbing behaviours are more closely related to the PPMSS product, they are still not product specific behaviours and as such, in accordance with Fietkau and Kessel (1981)'s model, if attitudes are not product specific then they will not have an impact on pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Replacement of Energy Efficient Appliances Before they Break

The bivariate results indicated that the replacement of energy efficient appliance before they break does not have a significant impact on the consumers' willingness to adopt the PPMSS. This finding is consistent with Fietkau and Kessel (1981)'s model which emphasized that one has to measure attitudes towards the product of interest to gauge its affect on behaviours (intentions, purchases) towards the product. (Kollmuss & Agyeman, 2002). So, measuring attitudes towards another energy product (energy efficient appliances before they break in this case) does not influence the intended adoption of the PPMSS.

Investment in Solar Panels

The bivariate results indicated that an investment in solar panels does not have a significant impact on the consumers' willingness to adopt the PPMSS. This could be because those who install solar panels may not necessarily want to adjust or sacrifice their lifestyle by using less energy. For example, M8 from the qualitative research explained that when the energy bill comes in "[w]e probably only look at what we owe and check what our solar contributions have been for that period. We do not adjust our usage."

Perceived Efficacy

The bivariate results indicated that perceived efficacy did not have a significant impact on willingness to adopt the PPMSS. This shows that many people do not take the lead and believe that their own actions can bring about change. This is similar to early adopters of technology, the majority of people are not early adopters of new technologies and usually the visionaries, the leaders and the most curious embrace these technologies first.

Non-Influential Financial Factors

Concern about paying bill

The bivariate results indicated that the consumers' concern about paying their electricity bill did not have a significant impact on willingness to adopt the PPMSS. This indicates that consumers may be feeling concerned but are not feeling 'stressed enough' or enough of a pinch in the rising prices for them to intend to act on their concern by being willing to adopt the PPMSS.

Financial locus of control

The bivariate results indicated that the level of financial locus of control that the consumer has in a post-paid system does not have a significant impact on willingness to adopt the PPMSS. This indicates that consumers feel that they have some degree of control in managing their electricity usage and they do not find this difficult. This also indicates that bill shock does not necessarily mean that the consumer will be more willing to adopt the PPMSS. Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. These results show that consumers in this sample are analogous to the frog in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react until they boiled to death (Kollmuss & Agyeman, 2002).” In this case, consumers are not reacting to the incremental rise in pricing and hence still feel that they have control of their energy usage, they may be managing their expectations by expecting a high bill as prices have gone up. For example, when M6 was asked how he reacts when he receives his energy bill he revealed the following reaction, “[o]h great the electricity bill is in. How much is it this time? I don’t feel surprised when I get them.”

Putting off other household expenditure to pay for the energy bill

The bivariate results indicated that the more frequently the consumer puts off paying household expenditure like rent, groceries, school fees etc. to pay for their electricity bill did not have a significant impact on willingness to adopt the PPMSS. This could be because approximately 2/3 of the respondents never have to put off paying other household expenditure to pay for their electricity bill.

Chapter Eight: Key Insights to Existing Body of Knowledge

Chapter eight will examine the key insights to the existing body of literature that can be extracted from this research to contribute to consumer psychology literature.

Driving Consumer Psychology Factors:

As can be seen below environmental consciousness, emotional involvement such as happiness, anger, fear and guilt, direct feedback and expectation of others' cooperation were all significant factors in the bi-variate regressions. The multi-variate regression indicated that happiness and direct feedback were the significant factors in the model. This chapter reveals that the results of this study, for the significant factors, are not always consistent with the existing body of knowledge for this context, measuring the 'intention to adopt the PPMSS'.

Environmental Consciousness

Consumers who are more concerned about the environment, tend to have more pro-environmental beliefs and also are aware of environmental issues will be more 'environmentaly conscious' and ultimately more willing to engage in pro-environmental behaviour. Environmental consciousness was composed of environmental concern, environmental beliefs and awareness (knowledge of environmental problems after scale purification. Environmental concern signified the individual's general consciousness toward the environment. Consumers with a stronger concern for the environment were therefore anticipated to be more likely to purchase products that are environmentally friendly than those who are less concerned about environmental issues (Yeonshin & Sejung, 2005), this was consistent with the findings in this study. Some studies have shown that those with stronger pro-environmental beliefs were more likely to engage in environmental oriented purchasing behaviour as beliefs shape our values and values precede pro-environmental behavioural action (Gadenne, Sharma, Kerr, & Smith, 2011), therefore, this was also consistent with this study's findings. However, awareness of environmental problems does not

necessarily mean that this will have strong predictive power on intended action to purchase the PPMSS as has been shown by previous literature (Kollmuss & Agyeman, 2002). In this study, environmental awareness formed part of the 'environmental consciousness' factor and therefore contrary to literature was shown to have predictive power on intention to adopt the PPMSS.

Emotional Involvement i.e. Sadness (opposite of happiness), Anger, Fear and Guilt

The bivariate regression results in this study indicated that there was a significant relationship when respondents are emotionally involved in the way that humans are altering the environment and this has a significant relationship on their willingness to adopt the PPMSS. The feelings of anger, fear and guilt had a positive significant relationship and the feeling of happiness had a negative significant. These results do not substantiate the literature which has shown that fear, sadness and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). In contrast, this study shows that the feeling of guilt is the most likely to trigger pro-environmental behaviour over the other emotions. In addition to this, these results indicate that negative feelings have a positive effect on pro-environmental behaviours and that happy feelings have the reverse effect. Furthermore, contrary to the literature, the multi-variate regression indicated that only the emotion of happiness had a significant impact in the context of this study.

Direct Feedback

The bi-variate and multi-variate results in this study indicated that the desirability of direct feedback through certain features inherent in the PPMSS has a significant impact on their willingness to adopt the PPMSS. This is as expected because these features are directly attributed to the product (the PPMSS) and are often not available in the existing traditional post-paid scenario. If consumers desire to utilise and have access to these novel features, then this will instigate adoption. This is consistent with Fietkau and Kessel (1981)'s model which

emphasized that attitudes need to be product specific in order to have any impact on pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Expectation of Others' Cooperation

Consumers are often strongly affected by social norms and by their expectation of what others will do. If consumers expect others to engage in energy conservation behaviour and make sacrifices consumers are likely to imitate this and will be more willing to adopt the technology, which in this context is the PPMSS. The results were significant in thi study, this is consistent with social dilemma theory and indicates that the expectation of others' cooperation (i.e. the belief that most other household consumers are willing to make sacrifices to conserve energy) had a significant on the willingness to adopt the PPMSS. (Gupta & Ogden, 2009). In contrast, the study also examined perceived efficacy. This construct tested the individual's perception of whether they have the ability to bring about change through their own behaviour. A strong internal locus of control means that they perceive that their actions can bring about change and their behaviours are less contingent on others' behaviours. On the other hand, people with an external locus of control believe that their actions are insignificant in the whole scheme of things and these changes can only be initiated by those in powerful positions (Hines et al., 1987). This study, contrary to previous meta-analysis studies (Hines et al., 1987), indicated that perceived efficacy did not have a significant impact on willingness to adopt the PPMSS. This shows that many people do not take the lead and believe that their own actions can bring about change. This is similar to early adopters of technology, the majority of people are not early adopters of new technologies and usually the visionaries, the leaders and the most curious embrace these technologies first.

In conclusion, when examining the significant factors in this study, some results were contrary to what the existing body of knowledge indicated should be the impact on pro-environmental behaviour.

Chapter Nine: Key Insights for Industry Stakeholders and Managers

Chapter nine will focus on the key insights for industry stakeholders and managers.

Key Insights for Industry Stakeholders and Managers:

This study indicates that consumer psychology factors need to be considered when marketing to consumers. If a consumer is 'environmentally conscious' i.e. they are more concerned about the environment, tend to have more pro-environmental beliefs and also are aware of environmental issues then they will be more willing to adopt the PPMSS. In addition to this, this study indicates that those who are most eager to adopt new technologies will be more likely to adopt the PPMSS, so early adopters should be targeted for the initial uptake of this solution.

The bivariate results indicated that perceived efficacy did not have a significant impact on willingness to adopt the PPMSS. This shows that many people do not take the lead and believe that their own actions can bring about change. This is similar to early adopters of technology, the majority of people are not early adopters of new technologies and usually the visionaries, the leaders and the most curious embrace these technologies first. Furthermore, the results indicated that the expectation of others' cooperation (i.e. the belief that most other household consumers are willing to make sacrifices to conserve energy) had a significant on the willingness to adopt the PPMSS. This indicates consumers will be more likely to subscribe to new products/behaviours if they perceive that the collective are doing so. Therefore, this is insight for marketers to target a campaign for the mass roll out of the solution so that it is perceived as a new 'norm' or a new popular choice.

The bi-variate regression results indicated that there was a significant relationship when respondents are emotionally invested in the way that humans are altering the environment and this has a significant relationship on their willingness to adopt the PPMSS. The feelings of anger, fear and guilt had a positive significant relationship and the feeling of happiness had a negative significant. These results do not substantiate the literature which has shown that fear, sadness and anger are more likely to trigger pro-environmental behaviours than guilt (Kollmuss & Agyeman, 2002). In contrast this study shows that the feeling of guilt is the most likely to trigger pro-environmental behaviour over the other emotions. In addition to this, these results indicate that negative feelings have a positive effect on pro-environmental behaviours and that happy feelings have the reverse effect. Furthermore, contrary to the literature, the multi-variate regression indicated that only the emotion of happiness had a significant impact in the context of this study.Therefore, marketing campaigners should emphasise the importance of invoking an emotional response in regards to the way humans are altering the environment and the part the consumer can play by adopting the PPMSS.

This research signals that prepayment meters are a powerful tool for consumers to monitor measure and hence manage their energy consumption and budget. Consumers can now be educated with an unprecedented amount of data and transparency on their energy usage. The more granular the data they receive (direct-feedback) in real-time the more empowered consumers are to change their habits. Despite direct feedback being a composite measure which had a significant impact on willingness to adopt (in the bi-variate and multi-variate regressions), each of the features in the table below have been examined in isolation so that there is an insight into which specific features the respondents preferred for product development and marketing purposes.

The most favoured features for product developers to consider are:

- A monitor with an interactive visual display placed within a visual location in the home
- A monitor that shows consumption and credit in dollars
- A monitor that shows how much energy the household is drawing at a particular time
- 24/7 access to an online meter account to access receipts and make payments
- 24/7 access to an online meter account to view consumption habits in a graph format
- Access to comparative data to see how much the household is using in comparison to neighbours in the building or area
- The ability to measure energy consumption per appliance
- The ability to determine the household's carbon footprint impact on the environment
- The ability to download an application on a mobile device to measure personal electricity consumption in real time
- The ability to receive reminder SMS and e-mail alerts to top up energy when credit is low

The least favoured features for product developers to be informed of are:

- The option to integrate electricity usage with popular social internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends
- The ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week). Therefore, just like the last social normative feature of direct feedback, respondents found the prior examined features more important.

Overall an analysis of financial factors indicated that these did not influence willingness to adopt. However, the survey unearthed that over 50.00% of the respondents are not willing to pay more for the additional features that the PPMSS provides, as explored above. In contrast, in the focus group there were mixed opinions whether consumers would be willing to adopt a prepaid solution at a premium. Those that desire the additional features and understand the behaviour change savings features may be willing to pay more for this option. As F8 mentioned, "I would be willing to pay 10% more on the tariff for the additional features in option 2 because I know if I can see how much I use I would definitely react and sacrifice my usage." F8 created a powerful analogy e.g. *"This is your lungs (monitor). Every time you smoke (use energy) they will get darker and darker… I would change my behaviour because I know I am harming myself." Humans need to see that they are visually harming themselves, the environment or their hip pocket for them to be driven to make change.* This could be a powerful campaign used to educate consumers on the importance of energy conservation management, through direct feedback, which is enabled through the adoption of prepayment smart meters. In addition to this, M11 mentioned "I would consider prepaid if it would give me a lot of control and flexibility (e.g. no lock-in contract) at a comparable (only slightly higher) price.

The study also indicated that consumers would like the option to be billed on a more regular basis than the current quarterly billing cycle. Purchasing electricity in prepaid mode enables consumers to control the frequency of payments they make and as such enables them to budget by monitoring, measuring and managing their energy usage and cash flow.

Furthermore, 31.00% of the respondents believe that the primary reason they would adopt the solution is because a prepaid smart meter would allow them to be in control of their destiny by managing their electricity consumption on their own. The second most common reason chosen by 23.80% of the respondents was that a prepaid smart meter would simplify the energy purchasing process by making energy billing more understandable and transparent. 19.00% of the

respondents recognised that a prepaid smart meter would allow them to seek the best financial rewards and savings on their energy bill which indicates that more consumers need to be educated on the fact that behavioural change impacts the financial reward and savings of energy consumers through the use of the PPMSS

In order for marketers to promote the PPMSS the three most common and trustworthy sources of education for consumers, according to this study are the energy supplier's website, family/friends and or neighbours or an online government website. The majority of respondents sampled would prefer to adopt a prepaid solution from the energy supplier.

47.00% of respondents trust their energy provider to assist them to optimise their electricity consumption. 31.40% said no they do not trust their energy provider and a remaining 45.00 % said that they do not know. A t test showed that the group who trusts their energy provider to inform them about actions to optimise their electricity consumption (N = 99) on willingness to adopt the PPMSS (M = 2.96, SD = 1.384) was higher in comparison, the second group that answered no (N = 66) (M = 2.42, SD = 1.278).

An analysis of demographic questions indicated that there was not a significant effect of primary state of residence, gender, level of educational attainment, hours of employment, level of gross household income or household size on willingness to adopt the PPMSS. In addition to this, there was not a significant effect of status at primary place of residence on willingness to adopt the PPMSS. The majority of the sample (66.20%) were permanent residents that owned their home and have stayed at the premises for more than 6 months. 24.80% were permanent resident tenants that have resided at their residence for more than 6 months. 3.30% are temporary residents who rent and have stayed at their home for less than 6 months and only 4.30% are permanent residents living in in public housing.

19.50% of the respondents sampled were older couples (married or committed relationship), retired with no children living at home. 14.80% of the sampled respondents were older couples (married or committed relationship) or single parent with independent children living with them. There was not a significant effect of current family life cycle on willingness to adopt the PPMSS. However, there was a significant effect of current family life cycle on the electricity bill level for the last quarter. Those who are in the lifecycle stage Full Nest III i.e. older couple (married or committed relationship) or single parent with independent children living with them indicated that they are the highest users of energy.

The majority of the sample was from 51 - 60 years old, then 61 - 70 years old and then 41 - 50 years old. There was a significant effect of age on willingness to adopt the PPMSS. This indicates that 31 – 40 year olds would be the most willing to adopt the PPMSS.

This study indicates that prepayment is infact ripening as a service option in Australia and it should be a choice available to energy consumers despite their age, income, gender or educational status. As M2 from the focus group states, “[w]e should all be given the option of prepaid at the very least!” As can be seen by the table above, this study found that 24.8% of the respondents probably would be willing to adopt the prepaid solution and 9% definitely would be willing. 20.5% indicated that they do not know, which emphasizes further education is required for consumers to understand the difference between the traditional and prepaid service options.

Chapter Ten: Limitations of Study Design and Future Studies

Chapter ten concludes this research with the limitations of the study design and suggests directions for future research.

Limitations of Study Design:

This study design has potential limitations that may present opportunities for future research. The usual caveats apply in this instance. In particular, the following limitations may have constrained this research endeavour:

- External validity issues due to sample of 210 people distributed over three Australian states the researcher is unable to generalize findings to all Australians as not all states have been tested.
- Focus group insights cannot be generalized to all Australians.
- Response bias as the survey takers may have answered favorably to the questions by making themselves appear more environmentally friendly than they are.
- Only those who have access to a computer and were registered on the Qualtrics panel database were able to participate in the survey. Qualtrics does, however, endeavour to ensure the quality and representativeness of their online samples by targeting and engaging participants from social media networks, online communities and a vast array of websites by using banners, invitations and messaging of all types.
- The sample size of 210 restricted more sophisticated data analysis techniques such as structural equation modeling.
- The researcher has only used one measure for 'willingness to adopt' (the dependent variable). Furthermore, measures of intention are known to be imperfect predictors of behaviours. Although some factors indicated that consumers would be willing to adopt the PPMSS, this does not necessarily translate into action because consumer behaviour is a complex phenomenon (Kollmuss & Agyeman, 2002). Humans do not alter their

habits very easily even if there is a distinct advantage of the new behaviour over the old one. Often, consumers may be willing to change their behaviour but they do not persist and practise the behaviour enough until it becomes a habit (Kollmuss & Agyeman, 2002).

- The study only focuses on household decision makers rather than also assessing the roles of others in the household to influence willingness to adopt the PPMSS and what their preference may be.
- There should be further measures of "General Technology Usage" to assess the households' overall adoption of smart TV's, tablets and social media presence etc. to increase the robustness of this research and to assess any pre-existing exposure and affinity to technology.

Possible Future Directions:

1. Conduct Similar Study With A Larger Sample Size

Conduct the study with a larger sample size and cover more states in Australia. Create a structural equation model to ascertain a more complex model that is more representative of the interplay and effect of simultaneous factors as is the case in the real world.

2. Levels of Financial Literacy and Impact on Adoption of the PPMSS

M11 from the focus group pointed out that perhaps it would be useful to profile respondents by their actual or perceived problems with the payment of utility bills. The overall financial discipline is a determinant for the preference of adoption of this solution. He mentioned that he doesn't have any financial issues (e.g. no credit card debt) so he is fine with either prepaid or post-paid. It would be interesting to know whether people with less financial literacy would see prepaid as a help or solution to their problems by assisting them to manage their cash flow and budget easier.

3. Prepayment Solar Model and Preference of Adoption

A future study could be to explore the preference to adopt a solar model with the PPMSS. F9 from the focus group noted "[i]t would be interesting to generate solar energy and sell it back to tenants (at a discount) through the prepaid system." At the moment, solar companies have not been able to unlock and target the 'investor' market for solar. Investors currently do not have an incentive to install solar panels on the rooftops of their investment properties as there is a considerable payback period and they cannot bill their tenants and recoup the energy usage. However, if they were to install a private sub meter, this enables the landlord to keep the energy bill in their name and receive the feed in tariff (without losing this benefit if they would like to rent out their home), whilst still providing tenants discounted energy to the going market rates being charged by the energy retailer. This solution means that the landlord will have an account with the energy provider and recoup money from their tenants for energy and will be able to generate an extra return. Investors are also able to depreciate their investment with before tax income unlike owner-occupiers who are unable to deduct this investment and can only pay back the investment with after tax income.

This study would be based on those who already receive the feed in tariff at their primary place of residence. Currently, in Queensland if one sells or rents their home and there is a new electricity account holder, the new owner or tenant will not receive the premium feed-in tariff unless the new owner or tenant is their spouse. The solar system cannot be taken with them and they cannot continue to receive the same feed-in-tariff (Queensland Government 2017).

4. A Field Study of Australians Using the PPMSS

A field study could be conducted where consumers are asked to pilot the PPMSS and as such researchers may be able to assess the stickiness of pro-environmental behaviour through the actual rather than intended adoption of the solution. Arguably, the adoption rate should be higher due to the fact that

consumers will be more educated about the solution by having hands on experience, whereas this research study merely relies on an infographic to educate potential consumers on a relatively new solution in Australia. (This study could be extended to include water as a utility as well). The researcher could also conduct a longitudinal study rather than just assessing attitudes at a snap shot in time. This study could then be compared to this research study to see if the consumer is driven by the same factors

5. Behaviour Change Reduction Study

A future study could be a field study of consumers using a prepaid smart meter in their dwelling in order to monitor how the prepaid meter changes their energy consumption behaviour and hence reduces their bill. Many international studies have been conducted on the use of smart meters but there have not been many (if any) on prepaid smart meters in Australia.

As this study measures willingness to adopt but does not measure actual adoption this presents some limitations in our conclusions. A key consideration is the likelihood of adoption and solidifying habits into the future. In contrast to stand-alone energy feedback devices that are not used for billing, the PPMSS acts as an interactive 'vending machine' that empowers consumers with direct feedback on their energy consumption. Therefore, it can be argued that because consumers have to use the energy saving tool also as a 'vending machine' it is more influential on consumer's pro-environmental behaviour and financial saving outcomes than stand - alone energy saving devices that are not used for billing. The payment aspect prompts consumers to constantly interact with the device and as such will promote stickiness in pro-environmental habits into the future.

Prepayment smart meters empower consumers to plan for the future, not let the future plan them, when it comes to utilities. Consumers are given the opportunity to take control and reduce their energy costs without waiting for a bill to arrive later. As mentioned by F5 in the qualitative research, "[t]he paradigm of disconnection shifts from "you turned my electricity off (a customer disconnects for failure to pay past due amounts)" to "my electricity ran out (prepayment

balance of zero).” This by default makes consumers more accountable and they will conserve more energy this way. There will be a spirit of cooperation rather than blame, particularly in lower income demographics.”

6. Prepayment Study for Vulnerable Consumers Requiring Consumer Protection

Escalating power costs have instigated customers to become more aware of tracking and controlling their energy usage. Ombudsmen across states are receiving mounting complaints of disconnections due to customers not being able to pay their quarterly bills. Customers often forget the extent of their consumption over hot and cold periods once their energy bill arrives and thus experience bill shock. In light of this, a report commissioned by the Energy and Water Ombusman in NSW explains that it is timely to review the appeal for customers who would like to utilise a prepayment system for energy payments to tackle electricity bill shock alongside other strategies such as “more frequent billing and more frequent energy consumption information (e.g. monthly billing, smart metering and associated products to help manage usage); well targeted and appropriate levels of government energy concessions and emergency relief assistance, effective retailer hardship programs, energy efficient information and education, access to more energy efficient appliances and energy efficient properties(N. Energy and Water Ombudsman, 2014, p. 2).”

EWON considers that a prepayment meter system should be a choice available to all Australian energy consumers and should (N. Energy and Water Ombudsman, 2014):

- Be a viable option amongst a range of other options
- Be an informed choice for particular consumers
- Have robust consumer protections as already stipulated under the *National Energy Consumer Framework*

Juridictions that have already adopted the *National Energy Consumer Framework* are required to pass enabling legislation, as required by s.56 of the NERL, such as South Australia and Tasmania to unlock prepayment as a choice for consumers (N. Energy and Water Ombudsman, 2014).

Considering this recent legislation, a trial should be conducted (possibly in collaboration with a major Energy Retailer) to clarify regulatory issues and to identify potential regulatory gaps, particularly for consumers experiencing hardship in NSW.

A report commissioned by the Tasmanian Council of Social services indicated that whilst the vast majority of consumers who had chosen prepayment meters reported being happy with their choice (Young, 2006), the report contained a number of recommendations for improved consumer protections, many of which have been incorporated in the *National Energy Consumer Framework* provisions (N. Energy and Water Ombudsman, 2014).

Furthermore, over several years, the Energy and Water Ombudsman in Tasmania advised the Australian and New Zealand Energy and Water Ombudsman Network (ANZEWON) that complaints about prepaid meters were few and consumers infact complained about the delays in accessing a prepayment meter (N. Energy and Water Ombudsman, 2014).

It would be interesting to conduct a trial study on vulnerable consumers in NSW who have experienced disconnection in the current post-paid billing environment and install a prepayment meter for them to trial at their premises and see if they experience as much hardship in the prepayment system or to assess whether this option is something they would prefer.

7. Prepayment Study Comparing Difference Cultures

Different cultures in various regions of the world have a different mindset when paying their energy bills on time, in general or at all i.e. the propensity to honour undertaken household obligations. For example, the average time frame that Scandinavians take to pay their bills is less than 30 days on a 30 day invoice, whilst in the UK and Italy this can be > 100 days. Hence, there is a strong tradition in the UK and Ireland to use prepayment metering for utilities. This is important given that while Australia mostly has a warmer climate and does not get very cold, our culture and ways of life are British. It would be interesting to see whether cultures who take less time to pay for their energy bills would prefer prepayment over postpayment, compared to cultures like Australia, where the billing cycle is longer (quarterly).

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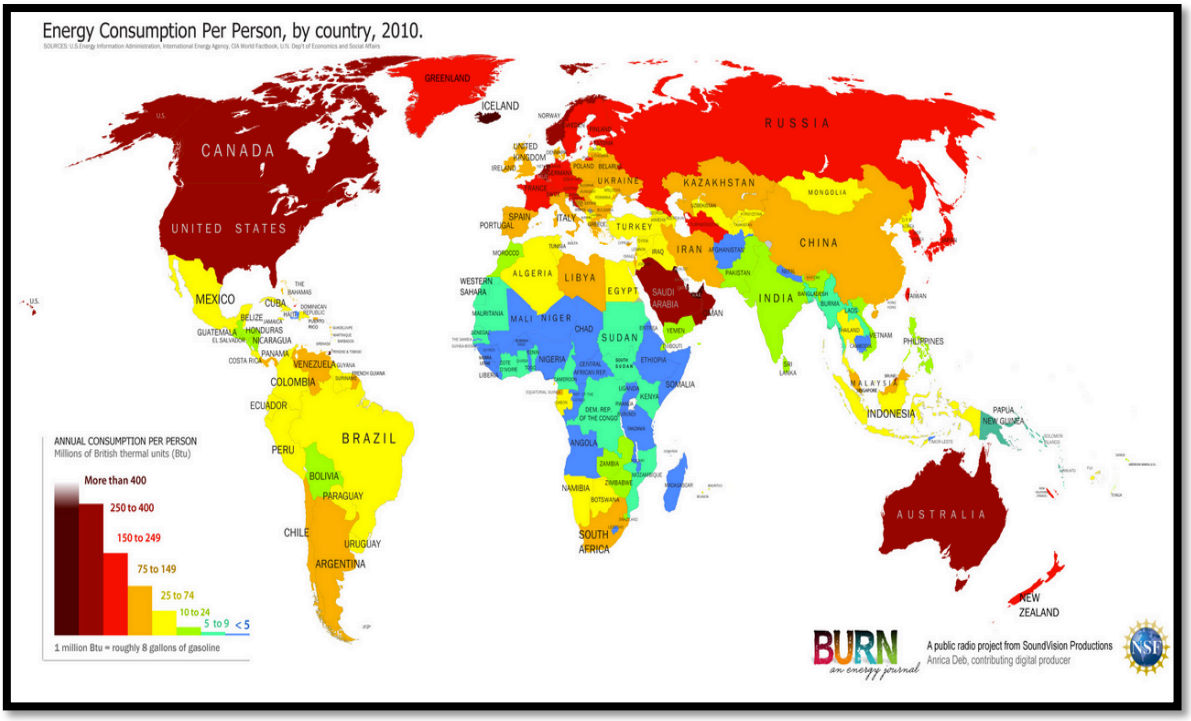
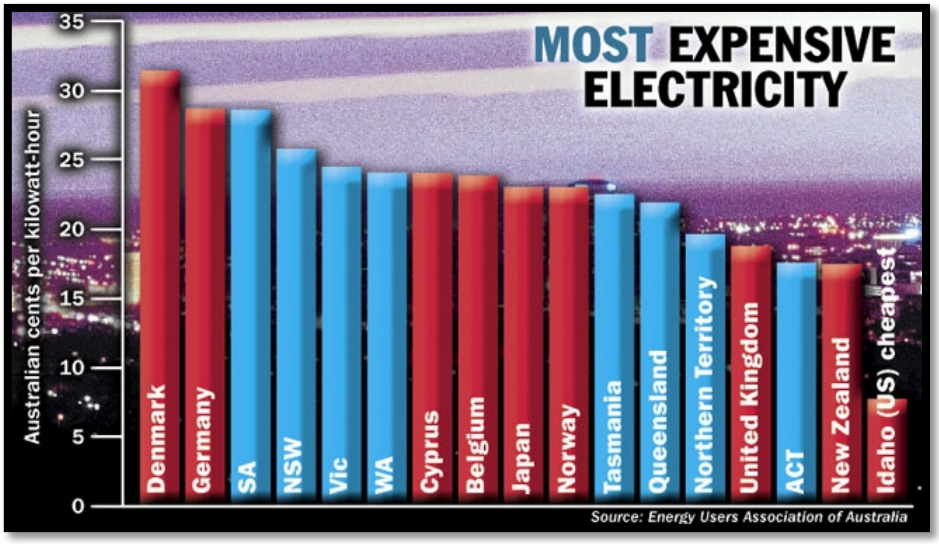
Appendices

Appendix A – Per Capita Energy Consumption Globally



Source: Burn: An Energy Journal (Burn, 2014)

Appendix B – Most Expensive Electricity



Source: Energy Users Association (Peddie, 2012)

Appendix C – Average Household Electricity Prices in 2011/12 and Australian Projections to 2013/14

Figure 1. Household electricity prices in Australia compared to common monetary areas and other major economies[ii] at average 2011 exchange rates

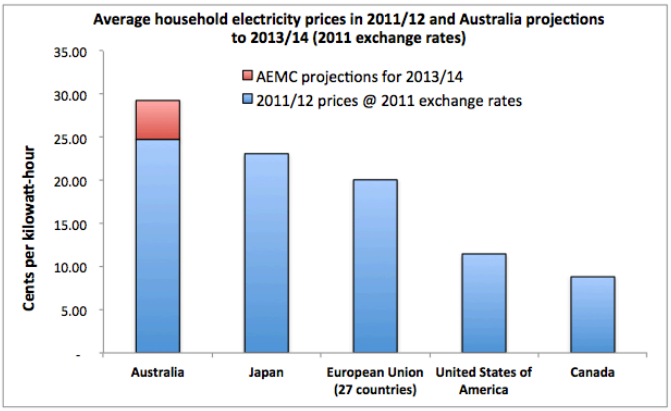


Figure 1 shows that at average 2011 exchange rates, Australia had higher average household electricity prices than the average prices in the other countries/blocs examined. In 2011/12 average household electricity prices in Australia (just under 25 cents/kWh) were 12% higher than average prices in Japan, 33% higher than the EU, 122% higher than the U.S. and 194% higher than Canada.

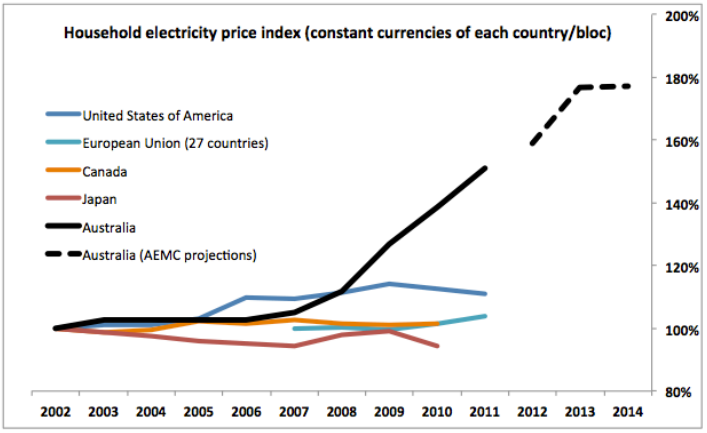
Figure 1 also shows the AEMC's projections of household electricity prices in 2013/14. Price projections for the other countries in the comparison are not known. As shown in Figure 2 below, prices in these other countries have been stable over the last decade.

Source: (Mountain, 2012, p. 12)

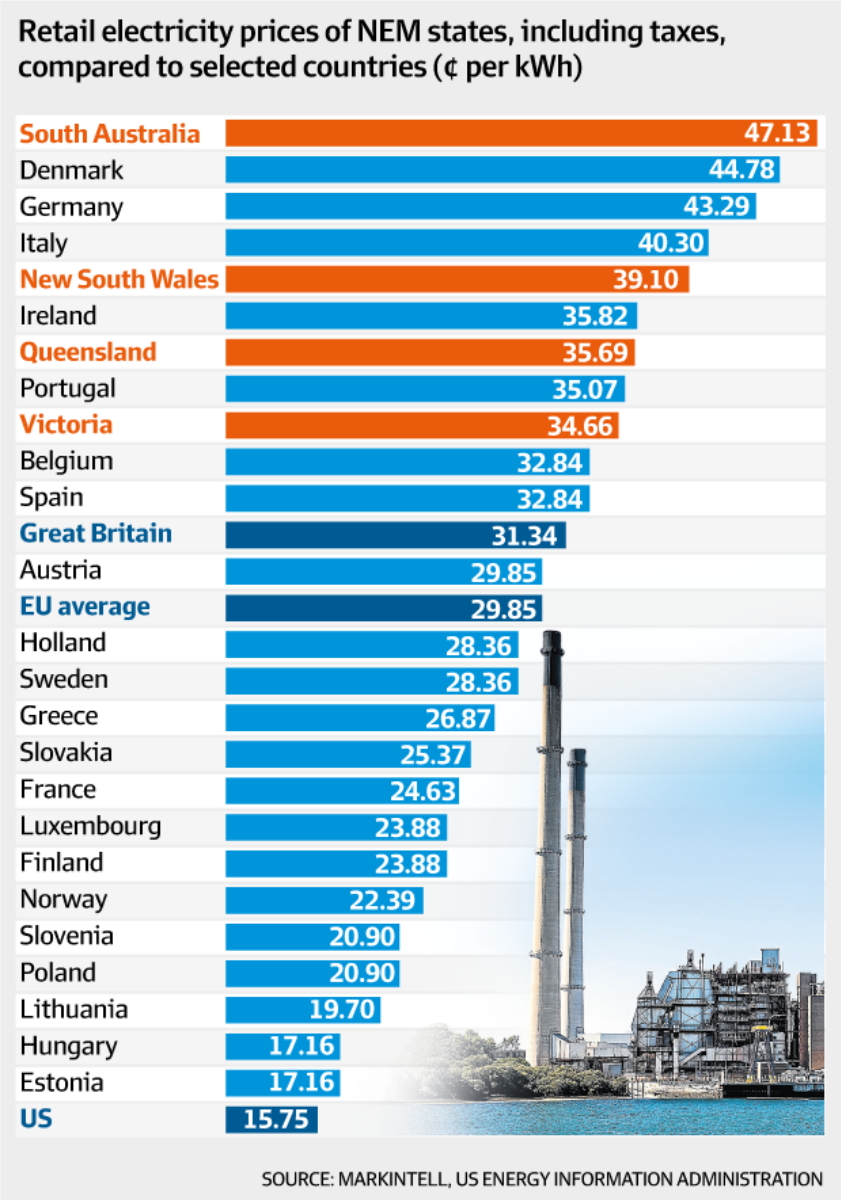
Appendix D – Australian Electricity Prices Projected to Rise Faster than Other Nations

Figure 2 shows that household electricity prices in the U.S., EU, Canada and Japan have been stable in the period from 2002 to 2010/11. By contrast Australian electricity prices were stable from 2002 to 2007 but since then have risen around 40% in real terms and are projected to rise a further 30% over the next two years.

Figure 2. Household electricity price index[iii]



Source: (Mountain, 2012, p. 10)



Source: (Australian Financial Review, 2017)

Appendix E – Launched Qualtrics Survey

Willingness to Adopt PPMSS

Q1 Please complete this questionnaire if:

You are 18 years old or above

You are an Australian resident residing in Queensland, Tasmania or Victoria

You are personally responsible for paying your electricity bill at your primary place of residence

Q2 What is your gender?

- ❍ Male (1)
- ❍ Female (2)

Q3 What is your age?

- ❍ Under 18 years old (1)
- ❍ 18-24 (2)
- ❍ 25-30 (3)
- ❍ 31-40 (4)
- ❍ 41-50 (5)
- ❍ 51-60 (6)
- ❍ 61-70 (7)
- ❍ 71-80 (8)
- ❍ 80 + (9)

If Under 18 years old Is Selected, Then Skip To End of Block

Q4 What is your primary state of residence in Australia?

- ❍ Victoria (1)
- ❍ Tasmania (2)
- ❍ Queensland (3)
- ❍ None of these (4)

If None of these Is Selected, Then Skip To End of Block

Q5 Are you primarily responsible for paying your electricity bill at your primary place of residence?

- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Block

Q6 To what extent do you agree or disagree with the following statements:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Most household consumers are willing to make sacrifices to conserve energy (Gupta & Ogden, 2009) (1)	❍	❍	❍	❍	❍
There is not much that one individual can do about energy conservation (Ellen et al., 1991) (2)	❍	❍	❍	❍	❍
The energy conservation efforts of one person are useless as long as other people refuse to conserve (Ellen et al., 1991) (3)	❍	❍	❍	❍	❍

Q7 To what extent do you agree or disagree with the following statements:

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I am extremely worried about the state of the environment (Yeonshin & Sejung, 2005) (1)	❍	❍	❍	❍	❍	❍	❍
When humans interfere with nature it often has disastrous consequences (Gadenne et al., 2011) (2)	❍	❍	❍	❍	❍	❍	❍
The balance of nature is very delicate and easily upset (Gadenne et al., 2011) (3)	❍	❍	❍	❍	❍	❍	❍
The increasing energy demand is a serious problem for our society (Sütterlin et al., 2011) (4)	❍	❍	❍	❍	❍	❍	❍

Q8 When you think of the way humans are altering the environment how do you feel (Kanchanapibul, Lacka, Wang, & Chan, 2014; Lerner & Keltner, 2000) (Adapted into separate emotion measures as per Lerner & Keltner)**?**

	Not at All (1)	Not (2)	Somewhat (3)	Very (4)	Extremely (5)
Happy (1)	❍	❍	❍	❍	❍
Guilty (2)	❍	❍	❍	❍	❍
Angry (3)	❍	❍	❍	❍	❍
Fearful (4)	❍	❍	❍	❍	❍

Q9 If you were looking for ways to reduce your energy bills, please indicate how likely you would be to take the following actions?

	Very Unlikely (1)	Unlikely (2)	Somewhat Unlikely (3)	Undecided (4)	Somewhat Likely (5)	Likely (6)
Make sure lights are off in unused rooms (Wimberly, 2014) (1)	❍	❍	❍	❍	❍	❍
Turn down the thermostat a few degrees to use less electricity when the residence is empty (Wimberly, 2014)(2)	❍	❍	❍	❍	❍	❍
Replace light bulbs with energy efficient light bulbs (Wimberly, 2014) (3)	❍	❍	❍	❍	❍	❍
Change the time of day when you use your appliances i.e. at off-peak periods (Wimberly, 2014)(4)	❍	❍	❍	❍	❍	❍

Pay attention to your electricity consumption by regularly checking the meter (own measure) (5)	❍	❍	❍	❍	❍	❍

Q10 Which of the following applies to you in regards to your energy related expenditures?

	Currently Have Installed (1)	Have Considered (2)	Have Not Considered But Will Do So In Future (3)	Would Never Consider (4)
Install solar panels (Ernst & Young, 2014) (1)	❍	❍	❍	❍
Replace existing appliances with energy efficient appliances before the old appliances are worn out (Wimberly, 2014)(2)	❍	❍	❍	❍

Q11 Which, if any, of the following do you seek energy advice from (Oseni et al., 2013)?

- ❑ Online government website (1)
- ❑ Online consumer group website (2)
- ❑ Online energy supplier's website (3)
- ❑ Environmental Non Governmental Organisation website (4)
- ❑ News website (5)
- ❑ Online other sources (6)
- ❑ Family, friends and/ or neighbours (7)
- ❑ Sales agent (Kuusela & Spence, 1999) (added measure) (8)
- ❑ Work colleagues (9)
- ❑ Don't seek advice (10)

Q12 Do you trust your energy provider to inform you about actions you can take to optimise your electricity consumption (Pyrko & Darby, 2010)?

- ❍ Yes (1)
- ❍ No (2)
- ❍ I don't know (3)

Q13 On a scale of 1 to 5 how concerned are you about paying your electricity bill (Ernst & Young, 2014)?

---

(1) Never Concerned at All **(2) Occasionally Concerned** **(3) Often Concerned** **(4) Always Concerned** **(5) Always Extremely Concerned**

Q14 How much was your electricity bill for the last quarter at your primary place of residence excluding any solar benefit you may receive (own measure)?

- ❍ Do not know (1)
- ❍ Less than $100 (2)
- ❍ $101 - $200 (3)
- ❍ $201 - $300 (4)
- ❍ $301 - $400 (5)
- ❍ $401 - $500 (6)
- ❍ $501 - $600 (7)
- ❍ $601 - $700 (8)
- ❍ $701 - $800 (9)
- ❍ $801 - $900 (10)
- ❍ More than $900 (11)

Q15 Which of the following best describes your typical reaction upon receiving your energy bill from the energy provider (Oseni et al., 2013)?

- ❍ I read it carefully every billing period (1)
- ❍ I read it quickly every billing period (2)
- ❍ I read it infrequently (3)
- ❍ I never read it (4)

Q16 Where is the energy provider's traditional meter currently located at your primary place of residence (own measure)?

- ❍ Inside the home (1)
- ❍ Outside the home, outside the building (2)
- ❍ Outside my home in a cupboard or utility room located within the building which I do not have access to (3)
- ❍ I don't know (4)

Q17 In the last year, how often did you check the meter reading of the meter supplied by your energy provider (Oseni et al., 2013)?

- ❍ Never (1)
- ❍ Once a Year (2)
- ❍ Every 3 months (3)
- ❍ Monthly (4)
- ❍ Weekly (5)
- ❍ Daily (6)
- ❍ Several times a day (7)

Q18 Are you currently being billed for your energy by your energy provider or Body Corporate/Owners Corporation based on actual or estimated meter readings (own measure)?

- ❍ Actual meter readings for sure (1)
- ❍ Estimated meter readings for sure (2)
- ❍ I assume actual meter readings (3)
- ❍ I assume estimated meter readings (4)
- ❍ I honestly do not know (5)

Q19 Have you complained to the Energy Ombudsman or energy provider in the last year and what was the main reason for your complaint if so (Oseni et al., 2013)?

- ❍ Yes, my bill was too high because I was charged too much. (1)
- ❍ Yes, my bill was delayed and not on time. (2)
- ❍ Yes, my bill was not detailed enough or understandable. (3)
- ❍ No, I did not have a problem. (4)
- ❍ No, even though I had an issue I did not report it to the Energy Ombudsman or the energy provider. (5)
- ❍ I did not know there was an Energy Ombudsman (6) (we added this one)

Q20

	Never (1)	Rarely (2)	Sometimes (3)	Most of the Time (4)	Always (5)
How often do you put off paying household expenditure like rent, groceries, school fees etc. to pay for your electricity bill? (Young, 2006) –(adapted measure) (1)	❍	❍	❍	❍	❍

Q21 Have you received any of the following outside help to pay for your electricity bill in the last year? You can choose more than one response (O'Sullivan et al., 2013).

- ❑ Grant or loan from family/friends (1)
- ❑ Government grant (2)
- ❑ Government loan (3)
- ❑ None of the above (4)

Q22 Most people receive a bill every quarter after they use electricity. Under this model how difficult do you feel it is to manage and control your electricity usage (QCOSS, 2015) (adapted measure)?

- ❍ Very Difficult (I have no control over my bill and often receive bill - shock) (1)
- ❍ Difficult (2)
- ❍ Somewhat Difficult (3)
- ❍ Neutral (4)
- ❍ Somewhat Easy (5)
- ❍ Easy (6)
- ❍ Very Easy (I have complete control over my electricity usage) (7)

Q23 We want to ensure our survey participants are paying close attention to each question. Please select "other" and type the word "survey" in the provided text box.

- ❍ Not at all like me (20)
- ❍ Not much like me (21)
- ❍ Somewhat like me (22)
- ❍ Quite a lot like me (23)
- ❍ Just like me (24)
- ❍ Other (25) _____

If Other Is Does Not Contain Survey, Then Skip To End of Block[2]

Q24 Do you currently have access to an in home energy visual display which shows how much electricity you are using live (own measure)?

- ❍ Yes (1)
- ❍ No (2)
- ❍ I don't know (3)

Q25 Do you currently have access to an online portal to view all the energy transactions that you have made and your usage in previous months and days (own measure)?

- ❍ Yes (1)
- ❍ No (2)
- ❍ I don't know (3)

[2] Attention Filter Question

Q26 If you could, how would you like to be charged for electricity (Young, 2006)?

- ❍ I would like to be charged at a set rate no matter what time of the day it is (1)
- ❍ I would like to be charged more or less depending on the time of the day I use electricity i.e. the price will be cheaper when less people are using electricity at that time (2)
- ❍ I would like to be charged a certain amount for the first 1000 KWHS and charged at a higher rate if I use more than 1000 KWHS in the billing cycle (3)
- ❍ These options are too confusing to compare (4)

Q27 Which of the following best describes your typical reaction to new technologies (Oseni et al., 2013)?

- ❍ I am always eager to try new ideas and products regardless of what others say (1)
- ❍ I am keen to try out new products early if I have heard some positive reviews (2)
- ❍ I like to collect more information and weigh the pros and cons (3)
- ❍ I make my decisions after my friends have (rely on others' views) (4)
- ❍ I am reluctant to adopt new technologies regardless of what others say (5)
- ❍ None of the above (6)

Q28 Please select if you ever purchased any of the following prepaid plans or services? You can choose more than one response (Wimberly, 2014).

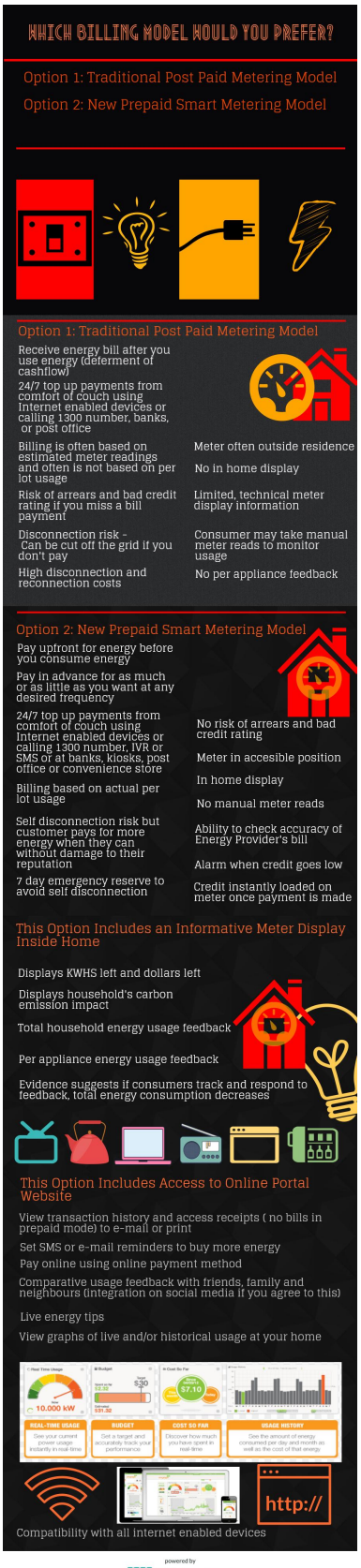
- ❑ Prepaid gift card (Amazon, I Tunes or Other) (1)
- ❑ Prepaid wireless phone services (2)
- ❑ Card that can be reloaded and functions as a debit card (3)
- ❑ Tollgate for transportation (4)
- ❑ Prepaid metro transit card (5)
- ❑ Skype credit (6)
- ❑ None of the above (7)

Q29 Have you ever used a prepaid meter for electricity, water or gas? If yes, please specify the country that you used it in and how you topped up the utility (coin, online payment, magnetic card etc) (own measure)

Q30 What one word would you use to describe the benefit of voluntarily using a prepaid electric services option? (own measure)

Q31 What one word would you use to describe your biggest concern of voluntarily using a prepaid electric services option? (own measure)

Q32


WHICH BILLING MODEL WOULD YOU PREFER?
Option 1: Traditional Post Paid Metering Model
Option 2: New Prepaid Smart Metering Model
Option 1: Traditional Post Paid Metering Model
Receive energy bill after you use energy (deferment of cashflow)
24/7 top up payments from comfort of couch using Internet enabled devices or calling 1300 number, banks, or post office
Billing is often based on estimated meter readings and often is not based on per lot usage
Risk of arrears and bad credit rating if you miss a bill payment
Disconnection risk - Can be cut off the grid if you don't pay
High disconnection and reconnection costs
Meter often outside residence
No in home display
Limited, technical meter display information
Consumer may take manual meter reads to monitor usage
No per appliance feedback
Option 2: New Prepaid Smart Metering Model
Pay upfront for energy before you consume energy
Pay in advance for as much or as little as you want at any desired frequency
24/7 top up payments from comfort of couch using Internet enabled devices or calling 1300 number, IVR or SMS or at banks, kiosks, post office or convenience store
Billing based on actual per lot usage
Self disconnection risk but customer pays for more energy when they can without damage to their reputation
7 day emergency reserve to avoid self disconnection
No risk of arrears and bad credit rating
Meter in accesible position
In home display
No manual meter reads
Ability to check accuracy of Energy Provider's bill
Alarm when credit goes low
Credit instantly loaded on meter once payment is made
This Option Includes an Informative Meter Display Inside Home
Displays KWHS left and dollars left
Displays household's carbon emission impact
Total household energy usage feedback
Per appliance energy usage feedback
Evidence suggests if consumers track and respond to feedback, total energy consumption decreases
This Option Includes Access to Online Portal Website
View transaction history and access receipts (no bills in prepaid mode) to e-mail or print
Set SMS or e-mail reminders to buy more energy
Pay online using online payment method
Comparative usage feedback with friends, family and neighbours (integration on social media if you agree to this)
Live energy tips
View graphs of live and/or historical usage at your home
10.000 kW
REAL-TIME USAGE
BUDGET
COST SO FAR
USAGE HISTORY
http://
Compatibility with all internet enabled devices
powered by
Piktochart
make information beautiful

Q33 Please take a few moments to go through the description above which briefly describes the difference between a prepaid and postpaid electricity metering solution. Given this description, moving forward if you had a choice which option would you prefer?

	Definitely Prefer Post Paid (1)	Likely Prefer Post Paid (2)	Don't Know (3)	Likely Prefer Prepaid (4)	Definitely Prefer Prepaid (5)
Preference Between Pre or Post Payment (1)	❍	❍	❍	❍	❍

Q34 If you had the option to purchase a prepaid metering solution in your area how willing would you be to adopt it?

	Definitely will not be willing (1)	Probably will not be willing (2)	Don't Know (3)	Probably will be willing (4)	Definitely would be willing (5)
Willingness to Adopt Prepaid Solution (1)	❍	❍	❍	❍	❍

Q35 Timing[3]

First Click (1)
Last Click (2)
#QuestionText, TimingPageSubmit# (3)
#QuestionText, TimingClickCount# (4)

[3] Attention Filter Function

Q36 If you were to adopt a prepaid meter which of the following would best describe your reason (check only one) (Accenture, 2013) (adapted measures)?

- ❍ A prepaid smart meter would make energy purchasing more convenient and efficient (1)
- ❍ A prepaid smart meter will allow me to be in control of my destiny by managing my electricity consumption on my own (2)
- ❍ A prepaid smart meter will allow me to seek the best financial rewards and savings on my energy bills (3)
- ❍ A prepaid smart meter appeals to my desire to test new technologies (4)
- ❍ A prepaid smart meter will create an educational experience for my entire family (5)
- ❍ A prepaid smart meter will simplify the energy purchasing process by making energy billing more understandable and transparent (6)

Q37 How important would the following features be to you if you had a monitor in your home that allows you to monitor, measure and manage your electricity usage in a prepaid manner?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
A monitor with an interactive visual display placed within a visible location inside the home (1)	❍	❍	❍	❍	❍	❍	❍
Monitor that shows consumption and credit in dollars and KWHs (2)	❍	❍	❍	❍	❍	❍	❍
Monitor that shows how much energy the household is drawing at a particular time (3)	❍	❍	❍	❍	❍	❍	❍

24/7 access to online meter account to access receipts and make payments (4)	❍	❍	❍	❍	❍	❍	❍
24/7 access to online meter account to view consumption habits in a graph format (5)	❍	❍	❍	❍	❍	❍	❍
Access to comparative data to see how much the household is using in comparison to neighbours in the building or area (6)	❍	❍	❍	❍	❍	❍	❍
Ability to measure energy consumption per appliance (7)	❍	❍	❍	❍	❍	❍	❍

Select extremely important for this statement. (13)[4]	❍	❍	❍	❍	❍	❍	❍
Ability to determine the household's carbon footprint impact on the environment (8)	❍	❍	❍	❍	❍	❍	❍
Ability to download an application on my mobile device to measure my personal electricity consumption in real time (Accenture, 2011b)(9)	❍	❍	❍	❍	❍	❍	❍
Ability to receive reminder SMS and e-mail alerts to top up my energy when my credit is low (10)	❍	❍	❍	❍	❍	❍	❍

[4] Attention Filter Question

The option to integrate electricity usage with popular social Internet websites (e.g. Facebook and Twitter) which allows users to share and compare their success against friends) (Accenture, 2011b) (11)	❍	❍	❍	❍	❍	❍	❍

Ability to create family activities and games around electricity consumption (e.g. contest on who is consuming the least electricity per week) (Accenture, 2011b)(12)	❍	❍	❍	❍	❍	❍	❍

If Select extremely important ... Is Not Selected, Then Skip To End of Block

Q38 Assuming you have chosen to adopt the prepaid metering solution over the post-paid option available would you be willing to pay more for this solution after considering the features above?

	Definitely would not pay more (1)	Probably would not pay more (2)	Don't know (3)	Probably would be willing to pay more (4)	Definitely would pay more for the additional features (5)
Payment for Prepaid vs Post Paid (1)	❍	❍	❍	❍	❍

Q39 If you were to adopt the prepaid smart metering solution would you be most likely to adopt the solution if it was offered by your utility supplier or would you be more inclined to buy one from a third party supplier so that you can audit and check the charges of the energy provider's meter?

❍ Energy Supplier (1)
❍ Third Party - Auditing purposes (2)

Q40 If you had a choice, how often would you like to make payments for your energy usage in prepaid mode?

- ❍ Whenever I need more energy at that time of day (1)
- ❍ Hourly (2)
- ❍ Daily (3)
- ❍ Weekly (4)
- ❍ Monthly (5)
- ❍ Quarterly (6)

Q41 What category does your primary place of residence fall under?[5]

- Suburban home (1)
- Home in a housing estate (2)
- Apartment in an apartment block of less than 50 units (3)
- Apartment in an apartment block of more than 50 units (4)
- Rural home (5)
- Rural home on acreage (6)
- Granny flat (7)
- Caravan park (8)
- Public housing (9)
- Other (10)

Q42 Which of the following best describes your status at your primary place of residence?

- Permanent resident (own) and stayed > 6 months (1)
- Temporary resident (own) and stayed < 6 months (2)
- Permanent resident (rent from landlord or real estate agent) and stayed > 6 months (3)
- Temporary resident (rent from landlord or real estate agent) and stayed < 6 months (4)
- Permanent resident (rent from public housing) (5)
- I prefer not to say (6)
- None of the above (7)

Q43 How many people are living at your primary place of residence, including yourself?[6]

- 1 (1)
- 2 - 4 (2)
- 5 - 7 (3)
- 8 - 10 (4)
- 10 + (5)

[5] The researcher acknowledges that they could have improved this question by asking for number of bedrooms and the size of the dwelling in square meters.

[6] The researcher acknowledges that to only measure the number of occupants may not be sufficient. It is arguable that a too small household size might have limited investment resources to consider a PPMSS given one income, and a larger household size might be limited too, given too many occupants' mouths to feed, and/or, too many voices to include in the decision making, or more voices towards a positive support of PPMSS.

Q44 What is your current family life cycle status?

- Bachelor stage - young, single not living at home (1)
- Newly married couple or couple in committed relationship - young, no children (2)
- Full nest I - young couple (married or committed relationship) or single parent with youngest child under six (3)
- Full nest II - young/older couple (married or committed relationship) or single parent with youngest child under eighteen years old (4)
- Full nest III - older couple (married or committed relationship) or single parent with independent children living with them (5)
- Empty nest I - older working couple (married or committed relationship) or single parent with no children living with them (6)
- Empty nest II - older couples (married or committed relationship), retired, no children living at home (7)
- Solitary survivor - in labour force (8)
- Solitary survivor - retired (9)

Q45 What is your highest level of educational attainment (Kollmuss & Agyeman, 2002)?

- Post - graduate degree (1)
- Bachelor degree (2)
- Diploma / vocational qualification (3)
- Year 12 or equivalent (4)
- Less than year 10 or equivalent (5)

Q46 What is your current work status usually (Chapman, 2011; Edwards & Pocock, 2011)?

- Paid employment (full-time > = 45 hours) (1)
- Paid employment (full-time 35 - 44 hours) (2)
- Paid employment (part-time < = 34 hours) (3)
- Paid self-employment (full-time > = 45 hours) (4)
- Paid self-employment (full-time 35 - 44 hours) (5)
- Paid self-employment (part -time < = 34 hours) (7)
- Not in paid employment (8)
- Retired (9)

Q47 If you are currently in paid employment or paid self-employment then what is the total current gross household income level per year before tax?

- Less than $15,000 (1)
- $15,000 - $25,000 (2)
- $25,001 - $40,000 (3)
- $40,001 - $60,000 (4)
- $60,001- $80,000 (5)
- $80,001 - $100,000 (6)
- $100,001 - $150,000 (7)
- Over $150,000 (8)
- I would prefer not to say (9)

Q48 What is your occupation?

- ❍ Financial or IT services sector (accountant, banker etc) (1)
- ❍ Legal services (lawyer, judge, paralegal etc) (2)
- ❍ Medical services (doctor, nurse) (3)
- ❍ Academic (professor, teacher, researcher) (4)
- ❍ House-maker / wife (5)
- ❍ Engineer (6)
- ❍ Entrepreneur - self-employed business owner (7)
- ❍ Student (8)
- ❍ Manufacturing services - scientist / tradesman (9)
- ❍ Sales or marketing professional (10)
- ❍ Office staff - receptionist and others (11)
- ❍ Between work (12)
- ❍ Unemployed (13)
- ❍ Retired (14)
- ❍ Not applicable (15)

Appendix F – Qualitative Research Transcript

Topic One: Feedback (direct and indirect)

How do you currently receive your Energy Bills? – Online or Post / Body Corporate or Energy retailer?

F1: Post / energy retailer

F2: Post

F3: Post and online / energy retailer

F4: Post / energy retailer

F5: Post / Body Corporate

F6: Online

F7: Online

F8: Post and online / AGL

F9: Post / Energy Retailer

F10: Post / Metered Energy in Body Corporate environment

F11: We have a prepaid meter which has electricity provided by the management. If we need to use more than the allocated amount, we purchase it online.

M1: Post / energy retailer (Origin)

M2: Post / energy retailer

M3: Post / energy retailer

M4: Online / energy retailer

M5: Online by e-mail / energy retailer

M6: Post / Body Corporate

M7: Online / energy retailer

M8: We receive our bill by post / energy retailer

M9: Post / energy retailer

M10: Body Corporate

M11: Online

What are your likely actions when you receive this bill (Do you read the bill carefully? Is it easy to understand? Do you change your habits of energy use?)

F1: "I mainly just look at the dollar figure. Then if I have time I will look at the breakdown and comparison to the same time last year. I am already fairly conscious of power use, so continue my habits."

F2: "I read the bill carefully and compare it to the last bill and it is relatively easy to understand."

F3: "Yes I read the bill. It is relatively easy to understand. Yes, in the fact of making sure that lights are turned off when leaving a room and making sure power points are switched off. No, in the fact of switching power plugs off, the kettles, dishwashers, washing machines and hair dryers."

F4: "I thoroughly read the bill and compare it to previous quarters. The bill is quite complex to understand due to different rates being applied on same bill. If I see energy consumption has increased I try and reduce my consumption so that the next quarter's bill is lower."

F5: “I look to see how many KWHS I have used and also what the daily supply charge component is. I like to compare my usage against my last bill so that I can monitor whether I have used more or less over different quarters and seasons however often this is too late. I do try to educate my family to use less once I have this knowledge. I think it is a good lesson for my children to know from young to conserve resources. The daily average usage details are a useful indicator on the bill I think and the historical graph. However, I think it would be useful to have live rather than historical feedback on energy consumption. As history is often the past and you can’t change how much you have to fork out of your hip pocket.”

F6: “I try to understand the bill carefully and if I find it too high I adjust my habits in order to spend less.”

F7: “Yes, I read the bill and compare it with previous bills. Sometimes, I try to change my habit of energy usage but it is really hard and unsuccessful.”

F8: “Yes I do look at it, not that very easy to understand due to language they use, I assume that they are correct and then I pay.”

F9: “Yes, not that easy to read but I do look at it. I am conscious; I tend to use my appliances more on low peak periods.”

F10: “Yes, I look if it has gone up or down sort of month to month. In terms of how it is made up it is not very clear to know where it is coming from.”

F11: “Having the prepaid option provides the opportunity of viewing usage and controlling it.”

M1: “Yes I read my bill carefully. The bill is relatively easy to understand. Yes, we change our habits in summer and in winter. We have solar panels but the electricity bills vary a lot. Sometimes we would get a credit of $100. Other times I have to pay $500. We now do a lot of our washing and cooking at night to save electricity.”

M3: “Doesn’t worry me as I have a solar system.”

M4: “I read the bill to confirm the readings are accurate and the total adds up to the agreed value. The bill is not easy to understand, as there are multiple tiers and times that each tier operates. We do not change our energy habits, as the bill is considered excessive.”

M5: “I usually check my consumption with average usage as well as last period consumption. If it is higher than average, I will try to use energy more efficient.”

M6: “Yes. I read the bill carefully mainly for the typical household usage. We normally have lower than average household usage so I feel there is no need to change our habits.”

M7: “It isn’t easy to understand, doesn’t explicitly label what I am paying for, and I find it difficult to interpret the bill. The only component I can understand is the bar graph visually showing my usage patterns.”

M8: “We probably only look at what we owe and check what our solar contributions have been for that period. We do not adjust our usage.”

M9: “No, it is hard to understand, no change of habits.”

M11: “I would give it a quick look and only consider it in detail if the bill was substantially different from what I expected.”

How often do you check the meter reading of the meter supplied by your energy supplier and where is this meter located and is it easily accessible?

F1: “Never, but now I might have to have a look now.”

F2: “Don’t check meter, don’t know where it is located.”

F3: “Having only lived in the resident property for 8 months (started December 2014), the meter was checked initially and then in June 2015. The meter is located on the side of the house as you enter to the back of the property and is very accessible.” This respondent lives on a rural property.

F4: “Never – not easily accessible as it is located outside of the property.”

F5: “I never check it I know that it is outside my home and it is like a ‘boy’s toy’. I am pretty sure my husband checks it once in a while.”

F6: “The electricity meter is not easily accessible. The gas meter is on the side of the house but in the garden. I do not check them.”

F9: “Mine is easy accessible just outside of the house, I never see the meter reader that comes to the house.”

F10: “I live in an apartment and I don’t know where it is located so I can’t check it.”

F11: “N/A we have a sub-meter, which we can see in the residence, I assume the Body Corporate and management have a meter from energy supplier to view the total building’s usage.”

M2: “Never and it is located outside the home.”

M3: “Not very often maybe once a month. It is located outside at back of the house.”

M4: “Never, the meter is locked behind a door that landlords and meter readers only have the key for.”

M6: “Never. I don’t even know where it is located.”

M7: “I don’t physically check the meter and I don’t know how to. I am not sure where the energy meter is located.”

M8: “We do not check our meter and it is positioned about 150 metres from our house, which is on a farm.”

M10: “I don’t, it’s not easily accessible.”

M11: “I haven’t done this yet. The meter is accessible in front of the house.”

Topic Two: Financial Control

Most people receive a bill every quarter after they use electricity; under this current system do you feel you have control in the management of your electricity usage?

F1: “No.”

F2: “Yes, to a certain degree as I always turn off appliances/lights that are not being used so we don’t use electricity unnecessarily.”

F3: “No.”

F4: “No because I receive the bill every quarter so I don’t really know what my consumption is until I receive my bill. Furthermore, receiving the bill on a quarterly basis and not on a monthly basis - one tends to forget about their electricity usage.”

F5: “No, I do not feel like I am in complete control of my usage as energy is often out of sight out of mind and I use it while I do other necessary tasks. The issue is that I am conservative and often switch off lights but I cannot necessarily always control the behaviours of my other family members and guests when they stay over.”

F6: “Receiving a bill every quarter does not make me feel in control of my electricity usage. In this way, it is hard to estimate which appliance mostly contributing in the bill.”

F8: “No, I don’t know what I am using the most, which I would like to know, and then I could control the electricity better, from dryer, dishwasher etc.”

F9: “No, you use your electricity and the bill comes afterwards so you do not have control of what you are spending.”

F10: “Mine comes every month but it does not give much control. It is not on a set day it just comes in that month.”

M1: “I don’t feel like I have control. Monthly would be better.”

M4: “No, there is no management through this process. The only way to have control is to have a live feed of used electricity.”

M5: “Yes, I can manage it for the next period.”

M7: “I don’t feel very in control with the meter usage system and the only control I feel I have is seeing my usage pattern in the bar graph.”

M8: “Yes we have always had the same system so I suppose our level of control has always stayed the same.”

M9: “No. Too long in interval to change habits. If people can get real live data or set more appropriate - short time targets - easier to change habits.”

M11: “Yes, even though I’m not sure how much the bill will amount to? Being in control of energy use is about having the right habits, e.g. turning off lights when leaving the room.”

How do you react when you get the bill? Are there any surprises?

F2: “Sometimes it is a surprise with the amount.”

F4: “Sometimes astounded when the bill is dramatically higher than what I expected it to be.”

F5: “I used to get shocked by the rising prices but I mitigated that by installing solar panels at my residence before the feed in tariff rules were changed.”

F6: “I don’t usually get surprised about the bill. I most likely expect a high bill not to get disappointed.”

F7: “No, most of the time our bill is the same.”

F8: “It has gone up because I have been using the heater lately. My bill is usually $200 was $400 this time!”

F9: “Electricity prices are going up!”

F 10: “Prices keep going up doesn’t seem to be a system to know how much it is going up by.”

M1: “Most of the time there are surprises. We have solar panels and the credits change all the time. Something we don’t even get any credits.”

M2: “Often there are.”

M3: “No, I actually I look forward to seeing it now due to solar.”

M4: “Only in winter, when the have heaters going. It is hard to estimate the cost with the standard way.”

M5: “No, they are more or less the same.”

M6: “Oh great the electricity bill is in. How much is it this time? I don’t feel that surprised when I get them.”

M7: “Not particularly, I see a bill of usually around $100 per quarter.”

M8: “We always expect a larger bill during the winter months and unfortunately we are always expecting power to go up in price.”

M11: “So far, no surprises. I expect there might be some after the winter period when we use electric heating quite a bit.”

There seems to be a consensus amongst respondents that energy prices are increasing and they expect high bills as the norm and as such do not experience ‘bill shock’.

Are you currently being billed using actual or estimated meter reads?

F4: “Actual (I think).”

F5: “I would hope that I am being billed actual meter reads however I don’t think this is the case because I have never seen a meter reader come to my house. This is worrying and I would like to pay for what I use.”

F6: “I am not sure.”

F8: “Estimated.”

F9: “I think it is actual readings but can’t guarantee it. I never see reader come read the meter.”

F10: “Mine is actual readings but I don’t actually see them come but it says on the bill that they come. I am with Metered Energy and they charge for hot water and electricity.”

M1: “Actual meter reads.”

M3: “Actual reads.”

M5: “It is based on actual meter reads.”

M6: “No idea. Probably estimated.”

M7: “I am not sure; I don’t see anyone coming to inspect the place so I can’t say conclusively.”

M8: “As far as I understand it is an actual reading as we have someone check our meter.”

M10: “Actual.”

M11: “Estimated.”

Are you familiar with your electricity tariff structure?

F1: “Not at all, I would have to guess.”

F3: “No.”

F4: “Not at all.”

F5: “Yes, I am on a fixed tariff and then there is also a daily supply charge. I think it is good that Queensland has a gazetted rate so that energy retailers can’t charge past that price cap!”

F6: “I have a superficial knowledge of it.”

F7: “No.”

F8: “Fixed.”

F9: “Yes, I know when peak periods are etc.”

F10: “Stepped tariff, but we did not get given any other options through Metered Energy.”

F11: “Have not paid much interest to it.”

M1: “Not entirely sure.”

M3: “Yes, it just changed again in July.”

M6: “Yes, I am renting and the premise only offers a single tariff.”

M7: “I am not.”

M8: “I have a vague idea but don’t understand it fully.”

M9: “Sort of - peak usage costs more than off peak usages.”

M11: “Yes, I have read it but having peak and off-peak tariffs doesn’t change the pattern of my electricity use.”

What is your preferred tariff structure (fixed rate, inclining block or time-of-use)?

F1: “Fixed is fine.”

F2: “Don’t know the difference.”

F4: “Time-of-use.”

F5: “I would say time-of-use, as I would take the effort to put my appliances on e.g. dishwasher and washing machine at off-peak periods.”

F6: “Time of use.”

F8: “Fixed rate.”

F 10: “Fixed.”

F11: “I think the best is fixed rate.”

M3: “Fixed rate is better.”

M4: “I prefer fixed, as our meter is and old version with the horizontal wheel.”

M5: “I prefer fixed rate. We are not home during the day and usually use electricity at nights, which would be more expensive in time-of-use structure.”

M6: “I don’t really know what inclining block means. I see cost saving potential with time of use tariffs over fixed rate but I have never had the opportunity to take advantage of them as I’ve always rented.”

M8: “I suppose a fixed rate allows you to have an idea of how much you are using but a tariff on your most used items would be good.”

M9: “Fixed rate – to avoid confusions and errors made with billings.”

M11: “I’m OK with the fixed rate but I don’t know what the other two options are.”

Do you currently have access to an in home visual display which tells you how much you are using live or access to an online portal to view your transaction history online?

F3: “No.”

F4: “No.”

F5: “No, but I do have access to a monitor that shows me how much solar energy I generate that is informative.”

F8: “No, just download the PDF file to pay through my e-mail no account and can’t access past bills, if I do I have to call them to ask them.”

F9: “Yes, I have a sub meter installed at my home with a meter display, which tells me what my usage is. I can go online and view transactions.”

F10: “I don’t have an in-house display. You can see all past bills in one place through an account. They don’t update it as regularly as they should (I think it is an average they say this is an estimate) and online is pretty hard to read. I would prefer to have a live data feed on the display and on a portal of what I am using.”

F11: “Yes, the visual display shows the balance of electricity left.”

M1: “No, but that sounds great.”

M6: “I’m not sure. I’ve never used it if I do.”

M7: “I do not.”

M8: “No, never had.”

M11: “Yes, online account.”

Topic Three: Perception of prepaid purchases/services and perception of prepaid utility metering specifically

What does prepaying vs. post paying mean to you? (Please explain in your own words)

F1: “Prepaying means buying credit to use down then re-buying. Post paying means consuming (possibly without thought) then having to pay.”

F2: “Prepaying: Prepay a certain amount of which you estimate you will use. Post paying: Paying for what you have used.”

F3: “Prepaying: it is proactive as I am in control of my energy usage. Can budget the expense (have greater certainty of the cost) and spread my usage to last longer. Post paying: it is reactive by which the expense has already incurred and cannot reduce the amount of the energy usage that has already been consumed.”

F4: “Pre-paying: Means having a defined cap budget so that I am in control of what I spend by paying upfront before I consume a good or use a service. Prepayment could be for an entire balance or an upcoming payment. Post-paying: Means having the luxury to pay later after a good or service has been consumed or used. I believe the consumer is less in control this way and tends to spend more.”

F7: “Prepay mean pay before. Post pay means pay after your usage and means arrears/late payments.”

F8: “Prepaid gives you more control over what you use, it is more transparent. Post-paid is after the event and you can’t do anything about it whereas prepaid you can.”

F9: “Prepay means your pay upfront and keep your eye on it to see if you want to top it up. Post pay means one payment whereas prepayment could be multiple payments.”

F11: “Prepaying is where I will pay in advance and get that amount of electricity. Post pay is where I will get the bill for the amount I have used.”

M1: “Prepaying means that you pay in advance for the electricity you anticipate you will use. This is similar to prepaid mobile phone credit, for example if I only want to spend $50 this month for my mobile phone. I buy credit for $50. Post-paid means that I can use as much electricity as I want and at the end of the cycle I will get billed for it. I don’t like this because I always spend more than I planned.”

M2: “Paying for a service before receiving the goods.”

M3: “Prepaying means to me that I pay for the energy before I use it, the benefit being that I am more aware of my usage rather than receiving one large bill every quarter.”

M4: “Pre-paying is paying forward money for an allocated amount of electricity. The allocated amount does not change for that prepay period. Post pay is essentially paying for what you use, after you use it.”

M5: “When you prepay there is no compulsory monthly payments, you can't over-use unless you top-up. In post payment, there is sometimes a lock-in contract and you will not be informed of your overspend till you receive your bill.”

M7: “Prepaying would to me mean paying a fix term rate before I have used any energy. Post pay would mean paying after the cycle period for some measured user of energy.”

M8: “Either you pay before you use the electricity on an estimated usage figure or pay after you the electricity on the actual amount used.”

M11: “Prepaying means I limit the risk of high bills from intentional or unintentional excessive use. It also means no commitment to one provider and easy switching when better plans become available.”

What are typical prepaid plans or services that you have used before? Do you like them? Why?

F1: “Gift cards e.g. MYER, iTunes. Prepaid mobile in the past, tollgate, metro cards locally, interstate and overseas. Yes and no, it is easier in some ways, but I don’t like the idea of someone having my money possibly making interest on it and not getting anything for it at that given point in time.”

F2: “Phone credit, gift cards. They have their benefits, as you don’t go over your cap or specified amount.”

F3: “Prepaid phones. Not keen on them because the service gets cut off after the limit is reached and it becomes a pain to get pre-paid credit.”

F4: “iTunes, pre-paid phone, tollgate (transports). Yes because it is a fixed cost and eliminates the risk of exceeding your limit.”

F5: “My gym membership, petrol, groceries, take-a-way food, my lawyer made me pay in a trust account before they completed the service, train ticket, online shopping, visa application.”

F6: “I use phone prepaid plans, prepaid bus card, Skype credit. I do like them as I feel more in control of what I spend for these services.”

F8: “Petrol is prepaid or cash buyer of a car. Gift voucher for massage and spa package to Versace for a year, I didn’t use it and then it expired! Depends on what it is, I like using prepaid on phone so I do not have to commit to a plan and I don’t get a scary bill. My friends have had $1000 - $2000 bills for their phones!”

F9: “Telstra mobile cards, groceries, and insurances you pay in advance (instalments) and tollgate. I like them because you can monitor your spending more.”

F10: “Internet wireless, Go Card to Brisbane on train. Depends on what it is for, you might not use it until long time down the track. If you are going to use it straight away and regularly then it’s good but if you are going to use it down the track, then you are out of pocket and then you might not even use it!”

F11: “Prepaid phones, prepaid metro card. Yes, I do like them because it is more convenient and it provides record of my usage. It defines the limits.”

M1: “Gift card (Myer), prepaid phone, Skype credit, Go card – great idea because you can plan ahead and be fiscally smart.”

M4: “Mobile phone, tollgate, public transport, iTunes. I used them because it is the only way to use those services and I know there is security in what I can purchase without blowing out the budget. The problem occurs when I need to recharge, as there are limited places to recharge or silly minimal top up amounts (i.e., Sydney road toll is $80).”

M5: “Prepaid phones. I didn’t like it because it was more expensive that post-pay plans.”

M7: “I have used the Skype prepaid system and the phone pre-paid system. The phone pre-paid system I never liked as credit would randomly disappear without any usage. Conversely, the Skype credit system is much better, with the only disadvantage being inactive credit after a prolonged period of time, however you can reactivate it. So, it’s not a big deal. Insurance premiums are another example where you usually pay at or before the start of the insurance period, the period of cover, but the premium may be payable in instalments during the insurance period.”

M8: “Only ever used a prepaid phone allotment, I found them ok, I suppose it allows you to know much you have to spend therefore giving you some control.”

M10: “Gift cards, mobile phones, Skype credit. They are OK and you can easily gift/transfer credit for the purpose of what giver intended unlike cash could go anywhere.”

M11: “I have previously used prepaid gift cards, public transport passes, and Skype credit. I also put fuel in the car before I use it rather than after. Assuming the same rates, I prefer prepayment over post-paid plans. For example, I continue to have a prepaid plan for my mobile phone because it's cheap, simple and I'm very happy with it.”

Are you aware of prepaid electricity? (Please describe in your own words)

F1: “No.”

F2: “No.”

F3: “Yes, a system installed in your property which allows you to pay upfront for electricity and heightens the consumer’s attention in regards to their usage.”

F4: “Yes, I have heard about it but have limited knowledge.”

F5: “Yes, one has to pay for their energy prior to consuming it. The system would deduct the credit downwards and then you have to pay more, rather than a cumulative meter reading in a typical post-paid system.”

F6: “No, I haven’t heard of it before.”

F10: “Yes.”

F11: “Yes. This would be where electricity is purchased in advance before usage rather than using and then being billed.”

M1: “Yes I am they have them in South Africa. It is the concept of paying in advance for electricity you anticipate you will need.”

M2: “Yes, and it is a good idea. Aurora Energy in Tasmania offers them I think.”

M4: “No, not by the major suppliers.”

M5: “No, not at all.”

M6: “No. This is the first time I’ve heard of it.”

M10: “Yes, I have seen them being used in New Zealand where I am from.”

M11: “I have used prepaid electricity in the UK before. I wasn’t aware this option was available in Australia.”

Are you aware of smart meters? (Please describe in your own words)

F1: “Yes, only the name.”

F3: “Yes, but I have not investigated them in detail.”

F5: “Yes, these are meters that are intelligent in the way that they have live data so energy providers do not have to arrange for meter readers to come to the home. If properly packaged and presented, advanced metering data can be a powerful tool to educate consumers.”

F9: “Yes, it is advanced metering infrastructure.”

M1: “No.”

M2: “Yes and it could be useful if correctly implemented.”

M3: “Yes we have a smart meter installed with the system.”

M4: “Smart meters by way of the big electricity companies as they can charge for the on an off-peak rates.”

M6: “Yes. I’m not really sure what the smart means though. I assume that it saves the energy company money by not having to pay somebody to inspect old meters.”

M7: “I have heard of them but don’t know the full description. They have more efficient technology to more accurately measure your energy consumption.”

M11: “No, I’m not sure what they are. I guess it they might be electronic devices that measure energy consumption and are complemented with an online/mobile service presenting up-to-date energy use information and facilitating credit prepayment. Possibly smart meters could include extra information on use per device or environmental impacts (carbon emissions).”

Does the idea of prepaid smart metering electricity interest you – why or why not?

F1: “Possibly. Of course, only if it’s cheaper in the long run.”

F2: “It would have to have a good benefit to our household to have us switch. Also, the cost in investing in this would have to be beneficial. Probably wouldn’t interest us at the moment as we are renting, but maybe when we buy our home.”

F3: “Absolutely, if it is proven to save in the long run.”

F4: “Yes – Because there are no contracts and no bills. You can constantly monitor your energy usage and if one requires more electricity, there is freedom to top-up when needed.”

F5: “Yes, I am someone who likes to be in control and conserve our precious resources. This will enable me to take action and reduce my energy costs without waiting for a bill to arrive later. I would particularly want this in my investment home as tenants often abuse the privilege of utilities included in the rent particularly in mine where I found out that the sub-leased the premises without my consent! I also like the certainty and control over disconnection. The paradigm of disconnection shifts from “you turned my electricity off (a customer disconnects for failure to pay past due amounts)” to “my electricity ran out (prepayment balance of zero).” This by default makes consumers more accountable and they will conserve more energy this way. There will be a spirit of cooperation rather than blame, particularly in lower income demographics. I think prepaid meters would also be a great arrears management tool for energy providers without requiring total disconnection of services.”

F6: “I would like to know what this is about, as I like being in control of my expenses.”

F7: “Yes, if it helps me to manage my energy usage.”

F8: “Yes, I can control how much I use and what I am using the most and then can adjust my habits. You have to just trust the Energy Company on what you are using when you enquire. No way to fight and audit the bill if there is an error, this is annoying.”

F10: “Interested to see how much each appliance is using and it is good to have the live feed.”

F11: “Yes it does. It is an innovation in this industry and it would be interesting to see how it is received in the market.”

M2: “Yes it does. It is good to be given the option at the very least.”

M4: “Yes, for a renter it does as it allows me to budget and know what I have to use.”

M6: “No not really, I feel that I’m in control and can manage my household’s expenses as they are due and it is better from a cash flow point of view. This would be a different story if I were a low-income earner and found it difficult to manage larger bills.”

M7: “If it saves me money yes.”

M8: “No not really, I would just prefer to pay for what I have used unless there is some form of financial saving.”

M10: “Yes, allows for better monitoring and controlling of energy consumption and consequently the opportunity to reduce energy bills.”

M11: “Yes, it does. I would prefer prepaid utilities with current information on use and remaining credit available online or on a mobile device.”

Have you ever used a prepaid electricity or water meter before? (What country, method and utility)

F1: “No.”

F2: “No.”

F3: “No.”

F4: “Never.”

F5: “Yes, a coin operated one in England when I was younger. This was for a gas meter I remember I would top it up to make sure we were not in the cold when it snowed. These days there are magnetic card and token operated systems so they are more sophisticated. I came across many of them in my travels to South Africa and Bali too.”

F6: “No, I haven’t.”

F9: “Yes, Australia.”

F11: “I am not sure if the one I am using currently is prepaid but we have to purchase online which means we pay before we get the electricity. Gold Coast, at Varsity Towers.”

M3: “Yes, there are some on the Gold Coast in student accommodation.”

M6: “No.”

M7: “I haven’t.”

M8: “No.”

M9: “No.”

M10: “Yes, I have used coin operated electricity meters in England in the late nineties.”

M11: “England, electricity.”

Does this graphic make clear the distinction between pre/post-paid?

Respondents were provided a graphical copy of the picktochart to review and the following feedback was received:

F2: “Yes, it is pretty clear.”

F3: “Absolutely clear.”

F4: “The pros and cons for each option are clear, succinct, easy to understand and informative.”

F6: “It is very much clear.”

F7: “Yes, it is clear.”

F9: “Yes, the differences are stated and seem to be factual.”

F11: “It is clear.”

M1: “Great graphic.”

M2: “Yes.”

M3: “Yes, it is very informative. Gives a clear idea of what is a better option and looks like prepaid is the way to go.”

M6: “I am unclear about the self-disconnection risk and the 7-day emergency reserve. But the other parts I understand and I mostly understand the distinction. How the technology is different would be a further inquiry.”

M7: “Seems all well explained.”

M10: “The features of each option are clearly delineated.”

Is there anything that you think should be changed in the graphic?

F4: “The red vertical line within each option looks like a comparison is made between the left-hand-side and the right-hand-side (showing competing arguments for the same option).”

F6: “I would rather show it in the landscape format with the two models one next to the other.”

F8: “Make the last page clear that it goes with Option 2 and include a heading. Maybe include arrows to the appliances? Try including air - conditioning in there, as Australians would use this appliance a lot due to lack of insulation.”

F9: “Maybe make the two options side by side if you can, landscape. The content is good.”

F10: “Make clear there is option for per appliance and overall home energy usage. It makes sense that the meter is outside and inside between the options. Also, I like that the ordering between the graphical content between the options is consistent.”

M1: “I would add how much people save in option 2.”

M4: “What needs to be shown is the saving comparison that can occur when the knowledge that you prepaid for electricity and know what you can use. Instead of post pay electricity that you do not know what you have used and by that time it can be too late and you are up for large bills. In the graphic, there needs to be physiological changes with evidence that it will save money or benefit the party who is putting it in their homes.”

M10: “The sections “Informative Meter Display Inside Home” and “Access to Online Portal” could be more clearly linked to Option 2. At the moment, it's not clear whether they apply to Option 2 or are generally available (under any option).”

What do you think? Would the prepaid option be something you would like to adopt? (Please describe in your own words) Why? Why not?

F1: “It would be good to be able to trial it without “risking” current arrangements.”

F2: “It might be something that we would consider in the future when we invest in our own home. The price of electricity to be competitive and discounts should be provided for paying up front as we get discounts from our current company for paying bills on time. The cost of installing the meter box would have to be minimal to make it an option. Don’t like the idea of running out of electricity though and having to top up could be an annoyance. “

F3: “The new prepaid smart metering model sounds very appealing from the point of you having sole control over your own energy consumption and you know that in the time of needing more credit, it is done instantly.”

F4: “I am open to trying out the prepaid option. I tried out the prepaid option 12 years ago on my mobile phone and have not switched to a lock-in-contract.”

F6: “I would love to try it. It interests me as I don’t like receiving “blind” bills and risking to pay way more than what I would expect.”

F10: “In home display and based on actual usage.”

F11: “I think it is a great idea because it helps monitor usage and avoid unnecessary debts when there is over usage and you cannot pay and/or have to cut expenditure from other areas to cater for the bill. Prepaid provides more awareness on the usage while post-paid does not.”

M5: “I don’t think it can help to reduce my electricity usage but I liked the idea of no manual reads. I am not really comfortable when somebody comes to my back yard to read the meter.”

M6: “Not really. There would have to be a clear cost advantage to going prepaid. I find the ability of the smart meter display would be novel at first but wonder how often it would actually be used.”

M7: “I would think this is a better model since it has reduced fees and more accurate readings. The only drawback is being aware of what the technological difference is and having a clear point of reference like a central website to educate the consumer.”

M10: “I would love to use the prepaid option but simply don’t have it as an option to me as the Body Corporate is in charge and I’m just a tenant. It is too hard for the individual end consumer to choose an option not readily available.”

M11: “Yes I would in combination with online credit card payment. (I wouldn't be interested in prepaid cards available in supermarkets and seven elevens) I associate prepayment with greater control and flexibility.”

What features of prepaid smart meters would be most appealing to you?

F1: “Pay per actual usage; no estimates.”

F2: “Knowing what we are actually using and not paying for more than what we use.”

F3: “All features described in the PICKTOCHART are really appealing.”

F4: “Paying upfront, meter is accessible; the live energy feedback is innovative, alarm when credit goes off.”

F5: “I like the idea of having per appliance feedback and knowing what my carbon footprint is on the environment.”

F6: “I like the idea of being able to estimate which of my appliances consumes the most and if there is effectively a time of the day when I would spend less. I also like to be able to decide how much energy I want to buy.”

F7: “It’s accessible in home and it has informative meter display.”

F8: “Online portal access, 24/7 top up option, alarm when credit goes low.”

F10: “In home display and based on actual usage.”

F11: “Ability to calculate average daily usage, visual display of balance and usage, alert when running low , small and convenient.”

M1: “I like that we have a device in the house, which shows us how much energy we have used. I also like paying for things in advance. I feel that I have more control over my finances. Also, it seems easy to top up.”

M3: “Having a visual display to monitor usage and easy access to pay.”

M4: “Daily usage, to keep up to date of where I am. Trending data, let me know what my history for the week or day is compared to last week, to last year. If I have the knowledge I will adjust my way of using electricity. Give me an average daily amount of electricity to use so I know if I go over I need to cut back some other days.”

M5: “No manual reads.”

M6: “If the meter could tell which appliances were using excess electricity compared to normal to highlight malfunctioning or inefficient equipment so that maintenance could be undertaken to save more energy that would be appealing.”

M7: “Accurate energy readings, reduced fees, and better technology. Simplicity is key for me also, above all.”

M8: “I suppose being able to check your usage when it suits you.”

M9: “Help you to be conscious of usage and will save money.”

M10: “All of them.”

M11: “Smart” information on energy consumption and the lack of uncertainty regarding the size of the next bill.

If you were to adopt a prepaid smart meter would you be willing to pay a premium for the additional control and features that the product gives you?

F2: “Not a premium, electricity is something that everyone needs to run a household and I would not pay a lot more to be able to monitor our usage as we already do a good job at doing this ourselves.”

F4: “Yes due to its unique features listed in the infographic.”

F5: “Yes, as long as it is not exorbitantly more expensive than other traditional post-paid plans.”

F6: “It depends on the premium.”

F8: “I would be willing to pay 10% more on the tariff for the additional features in option 2 because I know if I can see how much I use I would definitely react and sacrifice my usage.” F8 created a powerful analogy e.g. ***“This is your lungs (monitor). Every time you smoke (use energy) they will get darker and darker… I would change my behaviour because I know I am harming myself.”***

F9: “Yes, because in the long term you will be saving money through the change of your habits, I think this could be up to 30%.”

F10: “I would be happier to pay a set fee for prepaid option upfront, instead of the premium being reflected in the tariff.”

M1: “Not really, but depends on what these additional controls do. If they are more cost effective in the long run. I would buy it.”

M3: “Maybe, it depends how beneficial I would find it.”

M4: “There has to be a strong correlation between the savings from post pay. As a landlord and if I was renting out to students then yes, I would make them pay a premium as it would control them and make sure that they pay the bill.”

M6: “No. With energy price increases over recent years and more expected to come I would expect that this would have to be provided at the energy retailer’s expense as a competitive advantage over their competitors. After all, being prepaid they are getting the use of my money before I get the use of the electricity.”

M7: “As long as it was simple and I could see the benefit yes.”

M9: “Probably, depends on the ROI.”

M10: “No, it should be part of the service provided by my energy company because after all it is a tool to reduce their administration overheads, which we already pay for via “service” charge. No meter reading, no sending bills, no chasing arrears. Surely there must be energy providers that see this as a value-added service to build and retain a customer base when compared with providers that don’t have this option.”

M11: “No. I would still use post-paid if it was the cheaper option. I would consider prepaid if it would give me a lot of control and flexibility (e.g. no lock-in contract) at a comparable (only slightly higher) price.”

Would you adopt a prepaid smart meter from your energy supplier or third party so that you can audit the energy supplier’s main meter charges?

F1: “Unsure, probably third party.”

F3: “Third party.”

F4: “The third party is the preferred option if I cannot audit my energy supplier.”

F5: “Yes, this would make the system more transparent and make the energy suppliers accountable for over charging. Many of the energy provider’s meters are old and not calibrated so I don’t think they measure very accurately. Also, this would be great for my mother who lives in a Body Corporate environment so that she only pays for what she uses. As the Body Corporate takes the entire usage of the building and splits it over the lots she always subsidises for other over users when she lives on her own, this is unfair as she lives a very minimalist life and she boils two pots of kettles a day! It is also unfair for investors who have vacant units for most of the year.”

F6: “I wouldn’t mind getting a smart meter from the energy supplier in case it was cheaper. In case the cost was the same, I would prefer adopting it from a third party.”

F8: “Energy supplier.”

F9: “Another meter, so I can cross check the billing with the energy provider (I actually currently do this). This is a hybrid option; at the same time, I am aware of what I am using. System of proof if need to dispute something in court against the ‘big guys’.”

F10: “Energy supplier.”

M2: “Probably third party.”

M10: “No, it should be part of the service provided by my energy company because after all it is a tool to reduce their administration overheads, which we already pay for via “service” charge. No meter reading, no sending bills, no chasing arrears. Surely there must be energy providers that see this as a value-added service to build and retain a customer base when compared with providers that don’t have this option.”

M11: “I'm not sure what the difference would be. In practice, I would go with the cheaper or more convenient option. I have previously used third party (intermediary) companies to get my utilities connected.”

Any other comments in regards to billing of electricity:

F3: “At the moment, there is a good idea of how much energy consumption is used but should there be any signs of abnormal charges, we will be sure to investigate with the energy supplier. Should there be attitude and mistrust; the prepaid smart meter will be an alternative option. However, with the information received on the prepaid smart meter, it is a very attractive scheme and will be investigated as an alternative option to be self-sufficient.”

F4: “Rates constantly changing and offer different customers’ different discount rates based on where you live how ‘kind’ the customer service representative working for the energy supplier is when you request a discount.”

F5: “I find it confusing to compare different offerings between various retailers at times as I always like to bargain for a good deal.”

F8: “I hate the disconnection notices I get when I move residences in the post-paid system!”

F9: “It would be interesting to generate solar energy and sell it back to tenants (at a discount) through the prepaid system.”

F10: “If I was to stick to a post-paid option, the ideal billing cycle in post-paid billing would be monthly, as people usually do monthly budgets. Quarterly is not frequent enough.”

M2: “We should all be given the option of prepaid at the very least!”

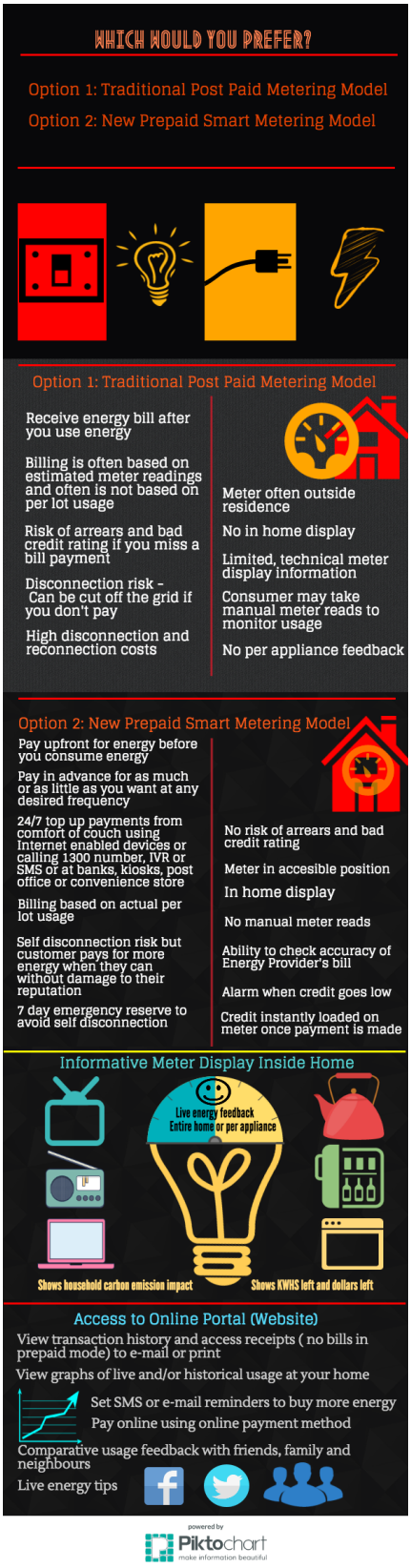
M4: “Great idea for renters who you know can do a runner. What is stopping you from doing this for all utilities (water, electricity, gas)? Personally, I need to see a benefit to prepay versus post pay. If there is to be a premium or it will not save me money I would stay with what I have. In the graphic, there needs to be physiological changes with evidence that it will save money or benefit the party who is putting it in their homes.”

M5: “Simplicity and a clear description of what the bill covers, i.e. lighting, hot water or gas etc. and so on.”

M7: “We are paying too much for electricity (justifications is that the infrastructure costs are high but the industry needs further competition to reduce cost) - just look at Telecom - now Telstra.”

M11: “For the study, perhaps it would be useful to profile responders by their actual or perceived problems with the payment of utility bills. I feel the overall financial discipline is a major determinant of the preferences described above. I don't have financial issues (e.g. no credit card debt) so I would be fine with either prepaid or post-paid. It would be interesting to know whether people with less financial literacy would see prepaid as a help or solution to their problems.”

Piktograph Presented in Focus Group



Final Piktograph Used in Survey After Focus Group Feedback[7]

[7] Actual size of piktographs 400% larger than shown here.